The Swedish Hip Arthroplasty Register

Annual Report 2005

256,298
PRIMARY THRs
1979-2005

30,052
REOPERATIONS
1979-2005
(closed reduction excl.)

24,476
REVISIONS
1979-2005

2,079
ENVIRONMENTAL/
TECHNICAL PROFILES
1979-2005

24,192
PATIENT OUTCOME
2002-2005

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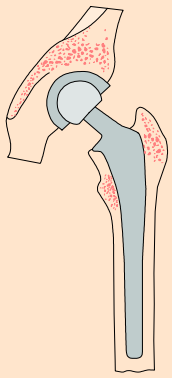
Alingsås
Arvika
Bollnäs
Borås
Carlanderska
Danderyd
Eksjö
Elisabeth-sjukhuset
Enköping
Eskilstuna
Falköping
Falun
Frölunda Specialist-sjukhus
Gothenburg Medical Center
Gällivare
Gävle
Halmstad
Helsingborg
Huddinge
Hudiksvall
Hässleholm-Kristianstad
Jönköping
Kalmar
Karlshamn
Karlskoga
Karlskrona
Karlstad
Karolinska
Katrineholm
Kungälv
Köping
Lidköping
Lindesberg
Linköping
Ljungby
Lund
Lycksele
Malmö
Mora
Motala
Movement
Nacka Närsjukhus Proxima
Norrköping
Norrtälje
Nyköping
Ortopediska Huset
Oskarshamn
Piteå
S:t Göran
Simrishamn
Skellefteå
Skene
Skövde
Sollefteå
Sophiahemmet
Stockholms Specialist-vård
SU/Mölndal
SU/Sahlgrenska
SU/Östra
Sunderby
Sundsvall
Södersjukhuset
Södertälje
Torsby
Trelleborg
Uddevalla
Umeå
Uppsala
Varberg
Visby
Värnamo
Västervik
Västerås
Växjö
Ystad
Ängelholm
Örebro
Örnsköldsvik
Östersund



Department of Orthopaedics
Sahlgrenska University Hospital
August 2006

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Foreword

The national quality registers are facing major changes when it comes to openness, the role of principals, financing and the increasing call for standardised information structures and internet applications. There are a number of reasons why the National Hip Arthroplasty Register is now entering a new era. Its pioneer, Peter Herberts, is now withdrawing as the person responsible for keeping the register and he has handed over this role to Johan Kärrholm who, with the assistance of Göran Garellick, will be leading the register. Peter's importance for the development of the register and Swedish hip replacement surgery cannot be overstated. With a great deal of assistance on the part of Lennart Ahnfelt and Henrik Malchau, Peter has put the register's name on the global map. In the future, with his large-scale experience and contact network, Peter will be involved in the management of the register as a consultant and adviser.

The openness of the national quality registers, when it comes to the presentation of results, has been an area of focus for several years. This year's report sees an increase in the number of openly reported variables for each hospital. The five- and ten-year survival of prostheses has been presented in the annual report since 1999 and, starting with this report, patient-related results (a pain and satisfaction VAS and the EQ-5D index) and short-term complications (re-operation within two years) will also be presented. These "quality indicators" have also been selected by the Swedish Board of Health and Welfare and the The Swedish Association of Local Authorities and Regions (SALAR) as national quality indicators.

On 19 June 2006, the report entitled "Open comparisons of the quality and efficiency of the health and medical service – comparisons between county councils in 2006" was published. This report presents 57 national indicators of quality and efficiency in different parts of the health and medical service. County councils are ranked for each indicator using diagrams in which the results for the whole country and differences between county councils are presented. The aim of this report is to present possible differences in quality, results, patient experience and costs and, as a result, stimulate county councils and the health service to implement improvements.

For several years, the operating costs for the quality registers have been covered either wholly or in part by funds from the Dagmar system, which are distributed by the so-called Decision-Making Group comprising representatives from the Swedish Board of Health and Welfare, the SALAR, the Swedish Medical Society and the Swedish Association of Nurses. Like a large number of the other national registers, this register has been "chronically underfunded" for many years. For a number of years, the operating costs, including salaries and systems development, have been covered by external funding, such as ALF funding and research funds. For various reasons, the opportunity for this kind of external funding has declined sharply during the past two years, while the operating costs, primarily those relating to salaries and IT, have increased.

From the start of next year, the principal responsibility for the national registers will be transferred from the Swedish Board of Health and Welfare to the SALAR. An investigation is currently in progress to determine whether responsibility for the cost of operating these registers should be placed with the county councils. For many years, the county council at which the person responsible for keeping a register is employed has been regarded as the principal of that register. To date, this has not, however, involved any financial responsibility.

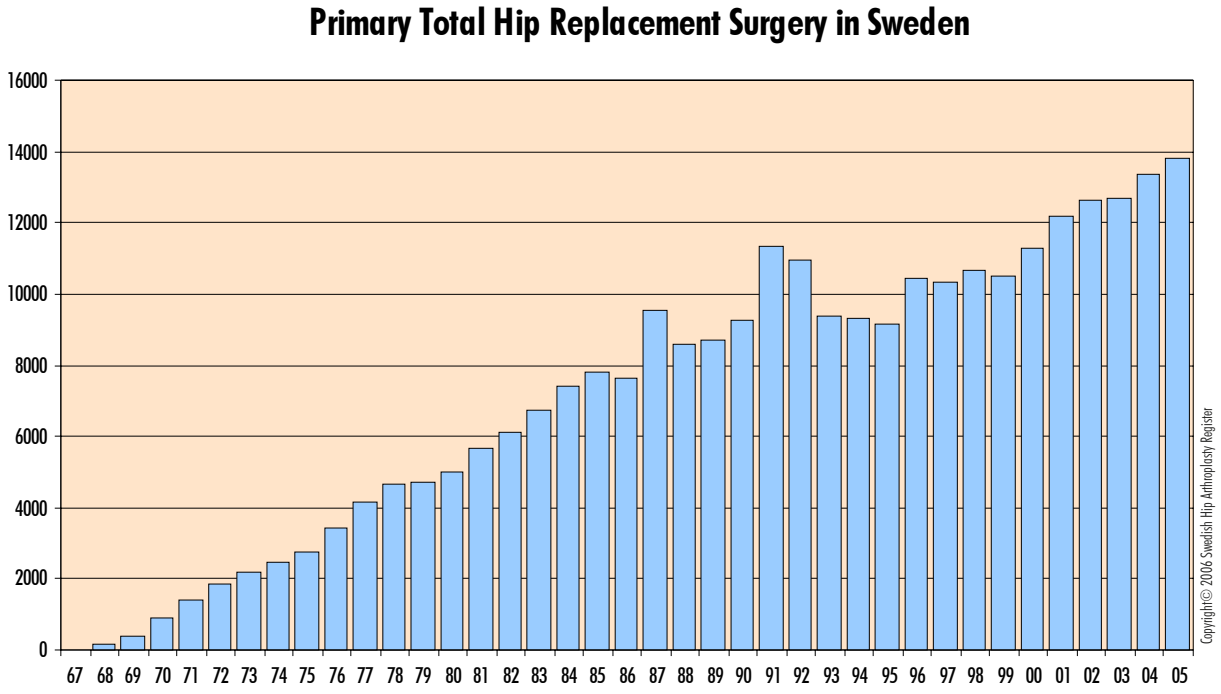
On 10 March 2006, the Swedish Government approved a new national IT strategy for care and welfare. As a result, the SALAR has initiated a project, the so-called IFK project (a Swedish acronym standing for information structure for quality registers), which is designed to create a uniform information structure for the national quality registers and the existing digital patient record system. In the future, this could facilitate the merger of different registers and create the opportunity for transfers between computer records and registers and vice versa. Within the foreseeable future, this will also facilitate the collection of data for the different registers – in other words, data will only be entered once in records or registers. When it comes to the implant-related registers (hips and knees), a development of this kind will primarily enable some supplementary medical variables to be incorporated in the register database without any additional work.

During the year, the Swedish Board of Health and Welfare and the SALAR have reviewed the web-based registers' websites in terms of readability, availability, openness and patient-oriented information and have then put forward recommendations for the design of these websites. As a result, the register website and internet application will be re-designed during the autumn to include a "popular scientific" presentation of results for both patients and the principal and ownership structure of the health service. In addition, the openly presented variables will be put on the website and this will result in a change to future annual reports. Most results will be on line on the website and a shorter, printed annual report will focus on in-depth analyses.

The members of the register steering committee are appointed by the board of the Swedish Orthopaedic Society. During the year, the previous steering committee, Lars Linder, Arne Lundberg and Anders Wykman, retired. The register management would like to thank them for many years of committed work and welcomes the new members, André Stark, Uldis Kesteris and Krister Djerf, who, in addition to the register management, are members of the steering committee.

Starting with this annual report, we shall also be changing our name to the Swedish Hip Arthroplasty Register. There are several reasons for this change of name; the confusion with the National Hip (hip fracture register) and the recently initiated Swedish Hemi-arthroplasty Register (which is kept by Cecilia Rogmark), which is a joint-venture project between the Hip Prosthesis Register and National Hip.

All the units (79 hospitals in 2005), both public and private, which perform total hip replacement (THR) participate in the register. The coverage is complete. The individually based registration of primary THR was introduced in 1992. Re-operations including revisions have been registered on an individual basis since the start in 1979.



Development of primary THRs performed in Sweden between 1967 (6 operations) and 2005 (13,822 operations).

Demographic data from primary THR are reported in the form of age, gender and diagnosis. The choice of implant and fixation method, together with the surgical technique, is analysed to enable an ongoing discussion about suitable developments and trends in this area. This information also acts as the basis for the learning process feedback data generate for each unit.

Individually based health outcomes are now documented from 75% of the country's clinics. The introduction of CPP (cost per patient) at every clinic, combined with measurements of health-related quality of life (EQ-5D), will create a nationwide opportunity to introduce the register's health-economy model.

The total number of re-operations and revisions continues to decline. This applies in particular in the Stockholm region. No hospital reports any large-scale delay in the reports of re-operations (as there was last year). As yet, we are unable to establish whether this reduction is due to a real reduction in the need for re-operations or whether it is a resource problem (more re-operations on the waiting list).

Receiving reports

All the clinics but three report via the web application. Copies of records from re-operations have been submitted with varying delays during the year. They are necessary for the analyses included in the report and for in-depth studies.

Reporting

All publications, annual reports and scientific exhibitions are shown on our website For more information, go to www.jru.orthop.gu.se.

This annual report has been delayed for a number of reasons and we would like to apologise for this. In recent years, the report has grown in scope as a result of an increase in the number of in-depth analyses. In the coming years, more results will be openly published on the website and, as a result, the scope of the annual report will once again decline.

The hip arthroplasty register is based on decentralised data collection and the work that is done by the contact secretaries and physicians at the clinics is therefore vital for the register to function. We extend our grateful thanks to all of you for the work you have done during the past year.

Göteborg, August 2006

Johan Kärrholm
Professor, MD, PhD

Göran Garellick
MD, PhD

Peter Herberts
Professor Emeritus, MD, PhD

The case-mix factor

Background

Starting with this year's report, the Register is increasing the number of openly reported parameters at county council, regional and clinic level. Open reporting offers many advantages and both decision-makers and register managers agree that the registers should be developed in a manner that promotes more openness.

The principal disadvantage, however, is the interpretation problems that occur when the results are evaluated by non-professionals and perhaps first and foremost by the mass media. Not infrequently, the misinterpreted mass-media reporting of treatment results impacts patients in the form of increased and often unnecessary anxiety.

Case-mix problem

The case-mix factor is the largest individual factor that leads to misinterpretations of register results which are difficult to interpret both within and outside the profession. Over the years, decision-makers in the Swedish Health service have criticised our register managers for not reporting all the results openly. The reason for this is not simply an unwillingness to report possibly poor and/or varying results. It is also due to interpretation problems.

Every register should develop some form of case-mix indicator and the most optimal solution would naturally be if we could find some part of it that was generally applicable to all disease groups.

Whenever reporting takes place, it is necessary to present the patients' demographic profile – the case-mix – in detail. Individual studies normally comprise more homogeneous patient material, depending on the inclusion criteria specified in the study protocol. A nationwide register study includes all patients, with a wide distribution of risk factors and a large difference between hospital profiles. More serious cases are referred to larger clinics and special units, which perform surgery on patients running higher surgical risks, when it comes to both short-term and long-term complications.

Case-mix and patient-related outcome

Back in 1972, Sir John Charnley wrote about the need to describe the demographic profile of a studied patient group and he then published his straightforward patient classification: Charnley A – unilateral hip disease, B – bilateral hip disease and C – multiple joint disease or intercurrent disease. The Charnley classification has a major impact on the outcome following hip replacement, measured using both disease-specific and generic instruments. C patients generally experience poorer results. This applies primarily to total values. The values that are obtained (the difference between pre- and post-operative results) in a prospective follow-up do not differ substantially. Age and gender also affect the result.

Case-mix and prosthesis survival

One of the principal interpretation problems is the fact that younger, "healthier" patients (i.e. Charnley A and B) usually obtain better values when it comes to patient-related outcome, but at the same time many of them also run a higher risk of long-term loosening and a need for revisions.

For this reason, we published a number of tables in last year's report showing the percentage of patients with primary OA in the 60-75 year age group. These patients represent the average of what can be expected when it comes to the burden on the health service in the form of care, level of surgical difficulty, post-operative course, costs and expected results. This group accounts for 41% of all THR operations in Sweden between 1992 and 2004 (n=141,703). During the same period, 3.2% of these patients underwent revisions, independent of cause. This incidence is 0.5% lower than that in the remaining group, which comprises all other patient categories.

In a Cox regression, the risk of revision is approximately 27% higher among patients outside this age group or with a diagnosis other than primary osteoarthritis. If the gender distribution is also specified, male gender represents a further increase in the risk of long-term complications. During the year, the register management will be focusing more heavily on the case-mix factor, with the aim of creating an index (a figure – dependent on gender, diagnosis and age), which can be given for each clinic and county council/region.

Discussion

To summarise, all interpretations of the register results should be correlated to the case-mix of the study group. We must also take account of what is to some degree an opposite effect on patient-related outcome and long-term loosening.

An effective, satisfactory analysis of the material in the register is essential to enable fair comparisons. It is the result at clinic level that is interesting to patients and decision-makers. The principals should be able to present good information about the detailed content of their activities in order to explain their position in national comparisons.

Primary THR

The register shows primary total hip replacements performed in Sweden since 1979. Up to 1991, the data were collected from individual clinics. Since 1992, individual-based information on the primary procedure has been used. This means that factors such as age, gender, diagnosis, surgical technique and the choice of cup and stem could be registered for every operation. Up to 1991, the reports were partially based on estimates. In 1999, two important changes were made. The first was that registration via the internet was made possible and, in 2005, this option was utilised by 76 of the 79 clinics which perform hip replacements in Sweden. The other three report using data files. The other change was that the registration was supplemented with article numbers for the different implant components that were used in each operation. As a result, each patient's implant and its various components can be identified in detail, thereby also improving the opportunity substantially to improve the analysis. Measures designed to enhance quality in the form of material and design changes can be monitored and any clinical problems can be traced in a way that was previously impossible.

During the period 1979-2005, 256,298 primary hip arthroplasties were registered. In 2005, the number of primary procedures increased by 457 compared with 2004 and totalled 13,848. The 15 most common implant combinations during the last 10 years are presented in tabular form. In the acetabulum, 92% of the components were cemented and 8% were uncemented during this period. On the femoral side, more were cemented (94%).

Between 2000 and 2005, the percentage of uncemented cups increased slowly from 7.2% to 10.8%. On the femoral side, uncemented fixation increased more sharply from 3.5% to 12.5%.

The first table (page 7) shows the most common implant combinations and their market shares. The figures are based on use during the past 10 years. All 15 of the most frequently used implant systems during the last 10 years are fully cemented.

Five implant systems dominate the cemented market: Lubinus (34.4%), Charnley (12.9% – three combinations), Exeter (11.3% – two combinations), Spectron EF Primary (5.3%) and the combination of the Charnley Elite cup and polished Exeter stem (4.5%). Among the stem components, Lubinus SP II dominates heavily and continues to increase, to 6,742 cases in 2005. It is followed by the Exeter stem in 3,213 cases and the Spectron stem in 923 cases. The CLS Spotorno increased successively to 695 in 2005 and is now by far the most frequently used stem that is implanted without cement.

The most common cup, the Lubinus increased to 5,764, the Exeter Duration declined to 1,264, while the Charnley Elite is used on more or less the same scale (n=1,401). The cup and stem components are often combined in different ways and even between different implant systems and manufacturers. The Exeter (polished stem) implanted with different types of Charnley cup has become by far the most common combination of this type.

Among the 15 most common uncemented prosthesis systems, use is primarily concentrated on those with well-documented function in the medium-term perspective. The CLS Spotorno with the Trilogy cup (with or without hydroxyapatite – HA) was the most common combination and was used in 262 cases. Both the CLS stem and the Trilogy cup are used in five of 15 of the most common uncemented combinations of the cup and stem design. In 2005, various versions of the Bi-Metric stem were the second most common uncemented stem (n=441), after the CLS (n=695), followed by the ABG (n=214). Of the uncemented cups, the Trilogy, with or without HA, was by far the most common and was used in 602 cases. It was followed by the Trident HA (n=165), Allofit (n=146), BHR (n=121) and CLS Spotorno (n=113).

Since 1999, the number of hip replacement operations in which the stem has been anchored without cement and the cup with cement (so-called reversed hybrid) has increased sharply. Until 2003, it was more common for the stem to be cemented, while the cup was implanted without cement ("classical" hybrid prosthesis). In 2004, the number of reversed hybrids exceeded the number of hybrids. This difference was further accentuated in 2005. Different versions of the Bi-Metric stem were the design that was most frequently used for the reversed hybrid (n=302). It was followed by the ABG (n=172) and CLS Spotorno (n=143). When it came to cups, the Charnley and Charnley Elite (n=245) dominated, followed by the Lubinus snap-fit (n=112) and Contemporary Hooded Duration (n=92).

Prostheses of the resurfacing type have been used conservatively. An increase has been noted since 2003 (n=71) and it continued in 2005 (n=189). The market is completely dominated by two implants, BHR (n=114) and Durom (n=74).

Hip replacement operations are more common among women. Since 1992, the women/men ratio has fluctuated around 60%/40%. Since 2003, we have seen a slight tendency towards equalisation. In 2005, 59.3% of patients were women. During the past 10 years, the average age of both genders has fallen from just above 70 years of age to just below among women and just above 68 years of age to around 67 among men. Between 2004 and 2005, the average age continued to decline among women, but appears to be levelling out among men.

In the group aged 60 and below, the number of uncemented implants primarily increased at the expense of the number of fully cemented implants. In the group aged 60, an increase in the number of all types of fixation has taken place. In relative terms, this increase is greatest among reversed hybrids. It is important to monitor and feed back these demo-

graphic changes. They reflect a combination of ongoing changes. In addition, the patient group as a whole has higher expectations and there is probably also an increase in belief in the quality of the procedure within the profession. More and more studies reporting high implant survival after long observation periods are being presented and the introduction of more wear-resistant joint surfaces has increased the potential for operating on younger patients. In theory, these demographic changes could also be caused by an earlier disease onset, but this hypothesis currently appears to be less likely.

Rural hospitals, central hospitals and private hospitals are performing an increasing number of primary operations and the tendency for fewer and fewer operations to be performed at university and regional hospitals in continuing. The sharp increase in operations at rural hospitals reflects the political aim of concentrating implant surgery at elective units. During the past 10 years, this type of hospital has almost doubled the number of these operations.

This trend has obvious advantages, but there are also some major disadvantages and risks. University/regional hospitals are responsible for research, development and teaching. When the frequency of standard procedures decreases sharply at this type of hospital, the basis for important R&D assignments also declines and this can then result in future stagnation and a reduction in resources in this area.

As yet, the majority of the elective units are not linked to the register follow-up routine (see the sections on patient-related outcome and free choice of care) and this is having a negative impact on the potential for open comparisons. A large number of the revisions that follow primary hip replacements at small elective units are performed at other clinics. In other words, primary surgeons are rarely required to perform re-operations on their patients. This represents another risk in relation to future quality, as the important individual learning process is lost.

The total number of primary hip arthroplasties and revisions a year using the four fixation principles, fully cemented, fully uncemented, hybrid and reversed hybrid, is shown in four diagrams on page 13. The diagram showing the total number (independent of fixation type) has been deleted. The histogram shows that the number of cemented and hybrid implants has been relatively constant during the past four years. Since 1999, the number of fully uncemented prostheses has almost tripled and the number of reversed hybrids has increased almost ten-fold. In spite of this, their relative share is fairly small, which is reasonable in the light of the fact that they have a limited indication area and that many designs lack sufficient long-term documentation.

RB in the figures stands for revision burden. This represents the ratio between the number of revisions in the form of the replacement or extraction of all or part of the implant and the total number of primary operations and revisions. The revision burden is a key figure in national and international comparisons. The total revision burden for the period 1992-2005 was 7.9% for fully cemented implants, 19.9% for fully uncemented implants, 11.3% for hybrids and 6.2% for reversed hybrids. The low figure for cemented implants in international terms can be regarded as being relatively representative of the production figures over the last few years. Some changes have, however, taken place (the Charnley stem has, for example, declined sharply) and they may impact the revision burden in the years to come.

As mentioned above, the RB is an important key figure in terms of comparison. In spite of this, it has obvious limitations. As many revisions are performed at clinics other than primary clinics, RB can really only be used as a quality variable in comparisons between different regions and counties. RB reports at clinic level do not provide a basis for fair comparison.

The RB for cemented and hybrid prostheses is relatively constant, in spite of an increase in the number of patients with hip implants in the population. When it comes to uncemented implants, there has even been a slight decrease, probably as a result of selecting better implants, even if other factors may also have had some effect. As reversed hybrids have been primarily used during the past five to six years and follow-up times are lacking, it would not be fair to use the concept of RB for this implant combination.

As before, the RB is higher for men in the large group of cemented prostheses, but it is far higher among women in the young patient group. The reason for this is not known, but different diagnosis distributions between men and women in the younger age groups may have some effect, something that was emphasised in last year's report.

The diagnosis distribution for primary operations has been surprisingly constant in recent years. Primary osteoarthritis has increased marginally and accounts for 76.3% during the entire study period. The number of primary hip fractures has not increased, which means that most cervical hip fractures in Sweden are operated upon using hemi-prostheses. In the younger age groups, primary osteoarthritis accounts for only 54.5% and in this group 16.5% are operated upon owing to inflammatory joint diseases and 14.1% owing to the sequelae of childhood disease.

Younger patients, below 50 years, are increasingly treated with uncemented implant systems (27.8%), hybrid fixation (21.5%) or reversed hybrids (7.1%). In this group, reversed hybrids account for only one third of cases. The tendency to avoid reversed hybrids in this young group can be seen in every diagnosis group.

15 Most Common Implants

most used during the past 10 years

Cup (Stem)	1979-2000	2001	2002	2003	2004	2005	Total	Share[1)]
Lubinus All-Poly (Lubinus SP II)	31,921	4,213	4,587	4,708	5,396	5,645	56,470	34.4%
Charnley (Charnley)	52,508	1,600	926	281	81	7	55,403	10.6%
Exeter Duration (Exeter Polished)	2,230	1,514	1,547	1,418	1,329	1,122	9,160	7.7%
Reflection All-Poly (Spectron EF Primary)	2,329	676	693	889	871	784	6,242	5.3%
Charnley Elite (Exeter Polished)	837	601	912	1,060	996	975	5,381	4.5%
Exeter All-Poly (Exeter Polished)	6,501	24	23	8	10	2	6,568	3.6%
FAL (Lubinus SP II)	232	347	810	832	707	579	3,507	3.0%
OPTICUP (Scan Hip II Collar)	1,183	383	279	125	10	0	1,980	1.7%
Contemporary Hooded Duration (Exeter Polished)	1	17	277	561	514	569	1,939	1.6%
Charnley (Exeter Polished)	555	103	159	281	433	517	2,048	1.5%
Charnley (Charnley Elite Plus)	1,396	105	14	2	0	0	1,517	1.3%
Charnley Elite (Charnley Elite Plus)	1,005	151	10	0	0	0	1,166	1.0%
Trilogy HA (Spectron EF Primary)	410	177	173	127	107	87	1,081	0.9%
Biomet Müller (RX90-S)	1,445	7	0	0	0	0	1,452	0.9%
Charnley Elite (Lubinus SP II)	325	103	76	140	176	186	1,006	0.8%
Others (total 994)	88,580	2,196	2,212	2,254	2,761	3,375	101,378	
Total	191,458	12,217	12,698	12,686	13,391	13,848	256,298	

1) Refers to the proportion of the total number of primary THRs performed during the past 10 years.

15 Most Common Uncemented Implants

most used during the past 10 years

Cup (Stem)	1979-2000	2001	2002	2003	2004	2005	Total	Share[1)]
CLS Spotorno (CLS Spotorno)	397	37	56	69	68	110	737	11.9%
Allofit (CLS Spotorno)	0	35	91	94	87	127	434	9.9%
Trilogy HA (CLS Spotorno)	4	6	19	24	80	177	310	7.0%
Trilogy (CLS Spotorno)	37	15	24	58	78	85	297	6.7%
Trilogy HA (Versys stem)	11	16	41	80	75	25	248	5,6%
Romanus HA (Bi-Metric HA uncem.)	227	18	4	1	5	3	258	5.4%
ABG II HA (ABG uncem.)	60	31	53	19	14	18	195	4.4%
Trilogy HA (Bi-Metric HA uncem.)	13	18	31	61	28	22	173	3.9%
Trilogy (Cone uncem.)	53	18	15	15	35	22	158	3.6%
Trilogy (SL plus stem uncem.)	27	10	15	17	26	30	125	2.8%
ABG II HA (Meridian)	22	20	31	32	9	0	114	2.6%
ABG HA (ABG uncem.)	304	0	0	0	0	0	304	2.4%
Secur-Fit (Omnifit)	104	0	0	0	0	0	104	2.4%
Trident HA (Accolade)	0	0	0	0	33	69	102	2.3%
SL Ti cup (CLS Spotorno)	24	15	5	13	9	12	78	1.8%
Others (total 197)	4,870	77	42	94	211	308	5,602	
Total	6,153	316	427	577	758	1,008	9,239	

1) Refers to the proportion of the total number of primary THRs performed during the past 10 years.

15 Most Common Hybrid Implants

most used during the past 10 years

Uncemented cup (cemented stem)	1979-2000	2001	2002	2003	2004	2005	Total	Share [1]
Trilogy HA (Spectron EF Primary)	410	177	173	127	107	87	1,081	20.7%
Trilogy HA (Lubinus SP II)	320	140	131	144	114	73	922	17.2%
BHR Acetabular Cup (BHR Femoral Head)	9	16	45	44	74	113	301	5.8%
ABG II HA (Lubinus SP II)	149	31	14	5	6	0	205	3.9%
ABG HA (Lubinus SP II)	338	0	0	0	0	0	338	3.3%
Reflection HA (Lubinus SP II)	107	12	19	15	23	10	186	3.3%
Durom (Durom)	0	0	23	25	33	74	155	3.0%
TOP Pressfit HA (Lubinus SP II)	8	25	32	24	31	16	136	2.6%
Duralock (uncem.) (Spectron EF Primary)	114	0	0	0	0	0	114	2.2%
Biomex HA (Lubinus SP II)	19	20	33	30	3	0	105	2.0%
Reflection HA (Spectron EF Primary)	98	0	0	0	0	0	98	1.9%
Romanus (Bi-Metric cem.)	550	0	0	0	0	0	550	1.8%
Trilogy HA (Optima)	96	0	0	0	0	0	96	1.8%
Mallory-Head uncem. (Lubinus SP II)	81	4	6	2	3	2	98	1.7%
Romanus (RX90-S)	181	0	0	0	0	0	181	1.7%
Others (total 222)	4,045	106	105	85	57	103	4,501	
Total	6,525	531	581	501	451	478	9,067	

[1] Refers to the proportion of the total number of primary THRs performed during the past 10 years.

15 Most Common Cup Components

most used during the past 10 years

Cup	1979-2000	2001	2002	2003	2004	2005	Total	Share [1]
Lubinus All-Poly	54,029	4,227	4,601	4,741	5,467	5,764	78,829	34.8%
Charnley	55,710	1,862	1,202	616	663	635	60,688	14.1%
Exeter Duration	2,350	1,592	1,630	1,534	1,470	1,264	9,840	8.3%
Charnley Elite	3,059	1,073	1,255	1,501	1,454	1,401	9,743	7.7%
Reflection All-Poly	3,685	704	718	913	888	826	7,734	5.5%
Exeter All-Poly	6,727	24	25	8	10	2	6,796	3.8%
FAL	233	348	819	843	728	597	3,568	3.0%
OPTICUP	2,720	422	312	181	91	62	3,788	2.9%
Trilogy HA	1,057	388	439	486	467	458	3,295	2.7%
Biomet Müller	4,024	286	256	236	205	211	5,218	2.3%
Cenator	2,445	194	3	3	6	0	2,651	1.9%
Contemporary Hooded Duration	1	17	277	565	561	684	2,105	1.8%
Weber All-Poly	183	120	150	259	362	197	1,271	1.1%
Scan Hip Cup	8,468	13	2	0	0	0	8,483	1.0%
Müller All-Poly	4,970	116	72	70	89	127	5,444	1.0%
Others (total 156)	41,797	831	937	730	930	1,620	46,845	
Total	191,458	12,217	12,698	12,686	13,391	13,848	256,298	

[1] Refers to the proportion of the total number of primary THRs performed during the past 10 years.

15 Most Common Stem Components

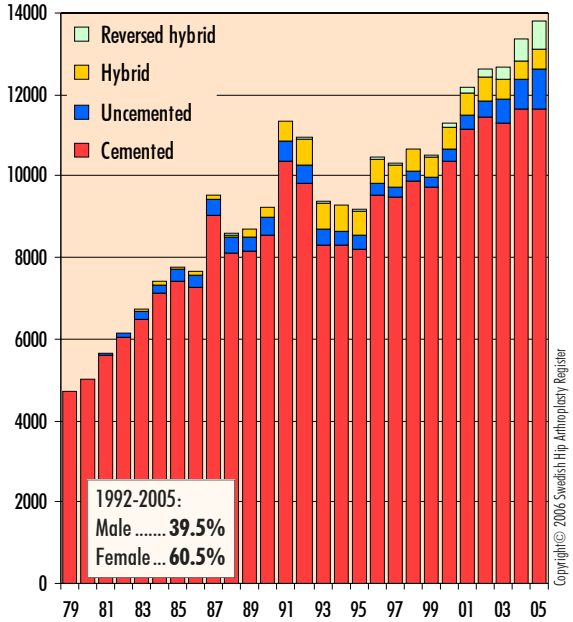
most used during the past 10 years

Stem	1979-2000	2001	2002	2003	2004	2005	Total	Share [1)]
Lubinus SP II	36,964	4,981	5,818	6,086	6,686	6,742	67,277	42.0%
Exeter Polished	20,494	2,515	2,972	3,364	3,299	3,213	35,857	20.2%
Charnley	53,625	1,606	927	281	81	8	56,528	10.7%
Spectron EF Primary	3,334	943	965	1,077	1,041	923	8,283	7.0%
Charnley Elite Plus	2,763	284	30	2	0	0	3,079	2.5%
Scan Hip II Collar	1,434	429	281	125	10	0	2,279	1.9%
CLS Spotorno	622	151	220	309	448	695	2,445	1.8%
CPT (steel)	662	293	279	198	48	3	1,483	1.2%
RX90-S	1,692	7	2	0	1	0	1,702	1.0%
Stanmore modular	272	285	303	91	80	50	1,081	0.9%
Müller Straight	4,341	110	103	98	98	114	4,864	0.9%
Straight-stem standard	216	117	120	145	207	208	1,013	0.9%
Cenator	1,245	0	0	0	0	0	1,245	0.8%
Bi-Metric HA uncem.	517	92	81	114	127	144	1,075	0.8%
Optima	1,438	1	0	0	0	0	1,439	0.7%
Others (total 167)	61,839	403	597	796	1,265	1,748	66,648	
Total	191,458	12,217	12,698	12,686	13,391	13,848	256,298	

1) Refers to the proportion of the total number of primary THRs performed during the past 10 years.

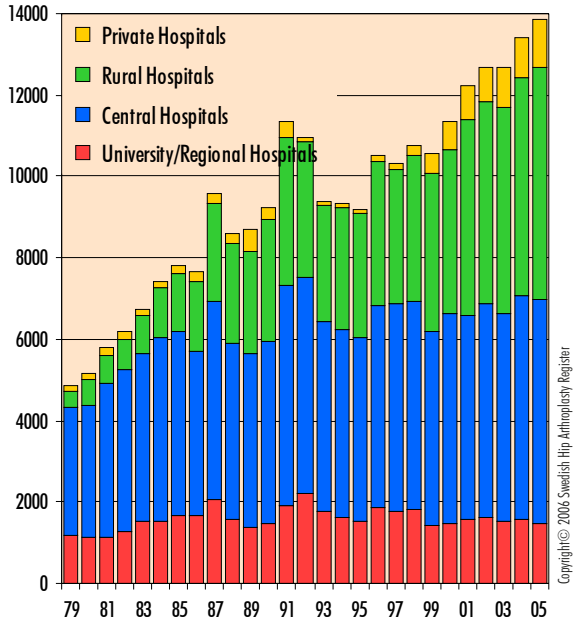
Number of Primary THRs

per type of fixation, 1979-2005



Number of Primary THRs

per type of hospital, 1979-2005



Number of Primary THRs per Hospital and Year

Hospital	1979-2000	2001	2002	2003	2004	2005	Total	Share
Alingsås	990	119	114	98	147	201	1,669	0.7%
Arvika	826	20	21	43	118	145	1,173	0.5%
Bollnäs	911	106	110	215	275	251	1,868	0.7%
Borås	4,006	169	127	151	198	234	4,885	1.9%
Carlanderska	866	83	73	42	50	56	1,170	0.5%
Danderyd	4,779	330	327	291	268	409	6,404	2.5%
Eksjö	3,134	162	177	150	190	191	4,004	1.6%
Elisabethsjukhuset	65	35	30	71	121	116	438	0.2%
Enköping	698	105	134	163	149	155	1,404	0.5%
Eskilstuna	3,443	112	75	66	65	75	3,836	1.5%
Falköping	948	252	260	223	213	227	2,123	0.8%
Falun	4,023	206	180	273	301	230	5,213	2.0%
Frölunda Specialistsjukhus	0	0	1	34	61	48	144	0.1%
GMC	5	0	0	0	17	42	64	0.0%
Gällivare	1,611	111	86	103	94	117	2,122	0.8%
Gävle	4,021	195	218	194	149	140	4,917	1.9%
Halmstad	2,600	221	203	171	164	175	3,534	1.4%
Helsingborg	3,034	152	176	100	102	71	3,635	1.4%
Huddinge	3,969	147	202	183	221	239	4,961	1.9%
Hudiksvall	1,817	138	165	186	160	129	2,595	1.0%
Hässleholm-Kristianstad	4,095	333	483	581	710	670	6,872	2.7%
Jönköping	2,861	196	163	162	221	185	3,788	1.5%
Kalmar	2,965	161	189	203	225	232	3,975	1.6%
Karlshamn	1,004	132	122	210	174	148	1,790	0.7%
Karlskoga	1,587	126	135	156	111	90	2,205	0.9%
Karlskrona	2,073	42	50	40	44	31	2,280	0.9%
Karlstad	3,096	92	163	216	235	220	4,022	1.6%
Karolinska	2,638	342	293	281	273	297	4,124	1.6%
Katrineholm	861	132	207	203	226	194	1,823	0.7%
Kungälv	1,219	191	198	175	124	229	2,136	0.8%
Köping	1,073	228	190	190	210	216	2,107	0.8%
Lidköping	1,188	152	111	102	118	149	1,820	0.7%
Lindesberg	1,225	83	133	138	161	120	1,860	0.7%
Linköping	4,371	134	250	207	122	76	5,160	2.0%
Ljungby	1,388	138	138	96	103	101	1,964	0.8%

(continued on next page)

Number of Primary THRs per Hospital and Year (cont.)

Hospital	1979-2000	2001	2002	2003	2004	2005	Total	Share
Lund	3,747	106	75	103	103	105	4,239	1.7%
Lycksele	1,203	155	196	200	212	274	2,240	0.9%
Malmö	5,055	176	135	109	128	116	5,719	2.2%
Mora	1,845	169	133	139	144	158	2,588	1.0%
Motala	1,245	123	147	161	229	421	2,326	0.9%
Movement	0	0	0	8	6	90	104	0.0%
Nacka Närsjukhus Proxima	0	0	0	0	0	17	17	0.0%
Norrköping	3,717	214	219	177	243	171	4,741	1.8%
Norrtälje	744	101	107	92	87	116	1,247	0.5%
Nyköping	1,781	127	125	121	124	150	2,428	0.9%
Ortopediska Huset	216	117	144	179	244	297	1,197	0.5%
Oskarshamn	1,087	113	112	114	137	178	1,741	0.7%
Piteå	549	72	98	92	137	183	1,131	0.4%
S:t Göran	6,267	549	463	443	507	474	8,703	3.4%
Simrishamn	661	29	153	187	214	205	1,449	0.6%
Skellefteå	1,517	147	160	148	119	120	2,211	0.9%
Skene	529	89	83	87	89	71	948	0.4%
Skövde	4,356	137	143	172	150	161	5,119	2.0%
Sollefteå	966	104	130	123	150	137	1,610	0.6%
Sophiahemmet	3,462	245	175	163	257	348	4,650	1.8%
Stockholms Specialistvård	6	70	99	130	136	207	648	0.3%
SU/Mölndal	2,010	149	123	118	88	92	2,580	1.0%
SU/Sahlgrenska	3,773	192	201	225	202	203	4,796	1.9%
SU/Östra	3,518	129	173	115	100	92	4,127	1.6%
Sunderby	3,919	151	127	117	151	130	4,595	1.8%
Sundsvall	4,237	200	198	181	161	148	5,125	2.0%
Södersjukhuset	5,134	237	257	222	219	256	6,325	2.5%
Södertälje	364	136	125	145	122	110	1,002	0.4%
Torsby	879	132	74	58	71	75	1,289	0.5%
Trelleborg	1,906	193	165	196	167	487	3,114	1.2%
Uddevalla	3,355	202	289	292	256	321	4,715	1.8%
Umeå	3,681	72	44	58	77	76	4,008	1.6%
Uppsala	4,261	258	259	230	328	285	5,621	2.2%
Varberg	2,713	219	219	168	192	179	3,690	1.4%
Visby	1,521	85	83	71	61	39	1,860	0.7%

(continued on next page)

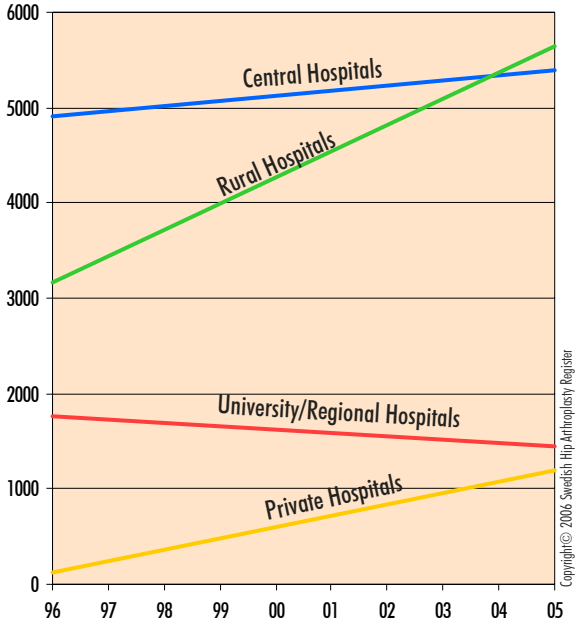
Number of Primary THRs per Hospital and Year (cont.)

Hospital	1979-2000	2001	2002	2003	2004	2005	Total	Share
Värnamo	1,639	98	92	101	127	146	2,203	0.8%
Västervik	1,889	92	114	114	121	105	2,435	0.9%
Västerås	2,598	121	122	88	122	130	3,181	1.2%
Växjö	2,524	106	106	68	129	122	3,055	1.1%
Ystad	1,944	121	108	98	111	63	2,445	0.9%
Ängelholm	2,152	184	186	151	105	51	2,829	1.0%
Örebro	3,828	134	190	195	179	168	4,694	1.7%
Örnsköldsvik	1,631	90	127	102	154	148	2,252	0.8%
Östersund	3,004	113	128	181	158	214	3,798	1.4%
Others [1)]	16,635	815	787	727	454	0	19,418	7.6%
Total	191,458	12,217	12,698	12,686	13,391	13,848	256,298	100%

1) Includes hospitals that are no longer active or do not perform primary THRs anymore.

Trends in Primary THR Surgery

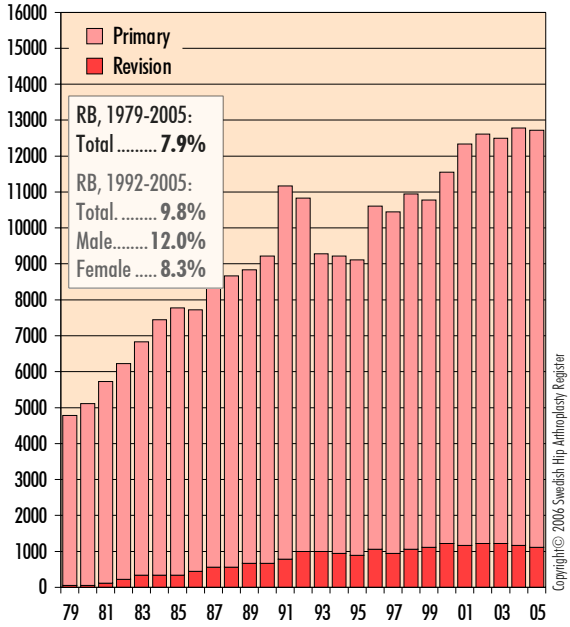
During the last 10 years divided per type of hospital



Year				
1996	1,860	4,966	3,527	156
1997	1,792	5,103	3,252	180
1998	1,823	5,082	3,610	246
1999	1,428	4,773	3,850	515
2000	1,477	5,169	4,005	688
2001	1,556	5,024	4,830	807
2002	1,632	5,223	4,960	883
2003	1,511	5,118	5,057	1,000
2004	1,554	5,538	5,329	970
2005	1,489	5,492	5,694	1,173

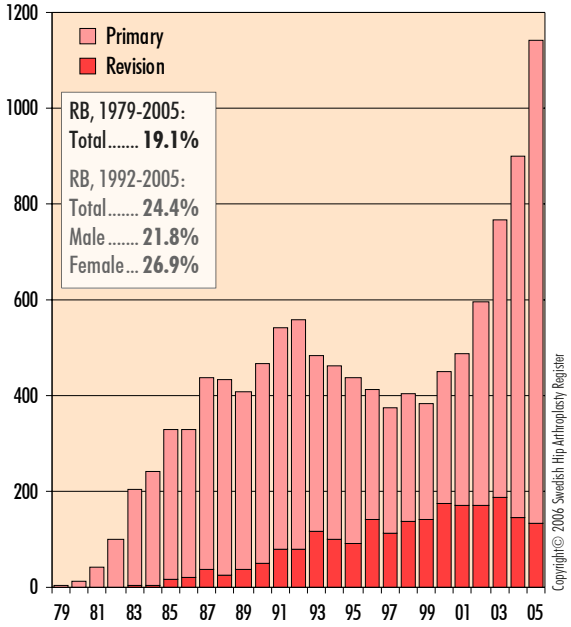
THR with Cemented Implants

234,584 primary THRs, 20,244 revisions, 1979-2005



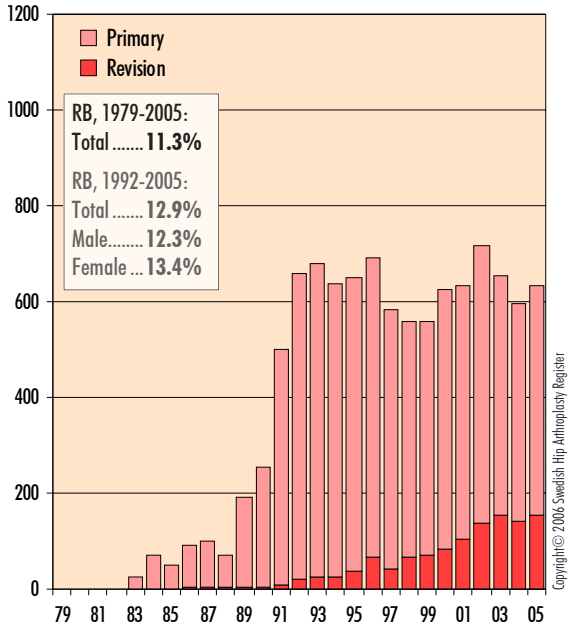
THR with Uncemented Implants

9,239 primary THRs, 2,179 revisions, 1979-2005



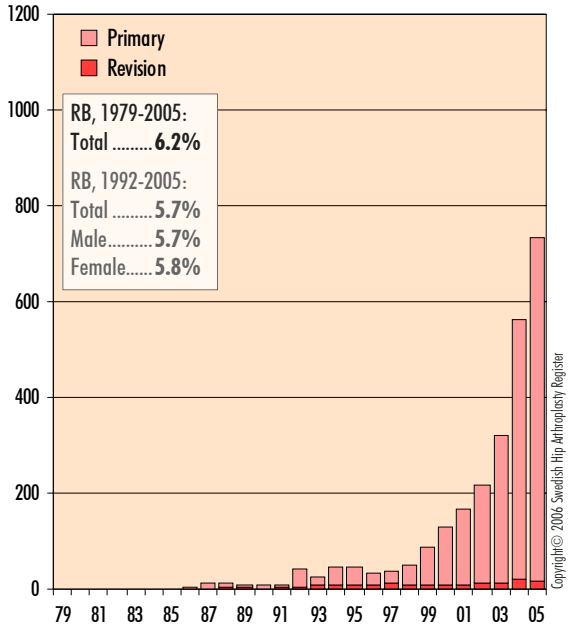
THR with Hybrid Implants

9,067 primary THRs, 1,157 revisions, 1979-2005



THR with Reversed Hybrid Implants

2,395 primary THRs, 157 revisions, 1979-2005



Number of Primary THRs per Diagnosis and Year

Diagnosis	1992-2000	2001	2002	2003	2004	2005	Total	Share
Primary osteoarthritis	66,625	9,562	10,188	10,115	10,784	11,508	118,782	76.3%
Fracture	10,637	1,522	1,433	1,473	1,482	1,314	17,861	11.5%
Inflammatory arthritis	4,893	426	374	377	354	323	6,747	4.3%
Idiopathic femoral head necrosis	2,716	363	331	343	343	338	4,434	2.8%
Childhood disease	1,277	255	289	272	322	268	2,683	1.7%
Secondary osteoarthritis	1,295	0	1	3	2	4	1,305	0.8%
Tumor	360	72	69	66	76	77	720	0.5%
Secondary arthritis after trauma	274	17	13	37	28	16	385	0.2%
(missing)	2,692	0	0	0	0	0	2,692	1.7%
Total	90,769	12,217	12,698	12,686	13,391	13,848	155,609	100%

Number of Primary THRs per Diagnosis and Year

1992-2005

Diagnosis	< 50 years		50-59 years		60-75 years		> 75 years		Total	Share
Primary osteoarthritis	4,026	54.5%	16,492	79.9%	64,408	82.1%	33,856	68.9%	118,782	76.3%
Fracture	252	3.4%	870	4.2%	6,384	8.1%	10,355	21.1%	17,861	11.5%
Inflammatory arthritis	1,218	16.5%	1,314	6.4%	3,152	4.0%	1,063	2.2%	6,747	4.3%
Idiopathic femoral head necrosis	452	6.1%	553	2.7%	1,590	2.0%	1,839	3.7%	4,434	2.8%
Childhood disease	1,043	14.1%	835	4.0%	659	0.8%	146	0.3%	2,683	1.7%
Secondary arthritis	99	1.3%	112	0.5%	473	0.6%	621	1.3%	1,305	0.8%
Tumor	86	1.2%	164	0.8%	312	0.4%	158	0.3%	720	0.5%
Secondary arthritis after trauma	57	0.8%	54	0.3%	136	0.2%	138	0.3%	385	0.2%
(missing)	151	2.0%	240	1.2%	1,316	1.7%	985	2.0%	2,692	1.7%
Total	7,384	100%	20,634	100%	78,430	100%	49,161	100%	155,609	100%

Number of Primary Uncemented Implants per Diagnosis and Age

1992-2005

Diagnosis	< 50 years		50-59 years		60-75 years		> 75 years		Total	Share
Primary osteoarthritis	1,182	57.6%	2,251	84.8%	1,024	89.2%	29	69.0%	4,486	76.1%
Childhood disease	373	18.2%	185	7.0%	38	3.3%	3	7.1%	599	10.2%
Inflammatory arthritis	224	10.9%	62	2.3%	24	2.1%	2	4.8%	312	5.3%
Idiopathic femoral head necrosis	125	6.1%	67	2.5%	22	1.9%	1	2.4%	215	3.6%
Fracture	46	2.2%	36	1.4%	19	1.7%	5	11.9%	106	1.8%
Secondary arthritis	32	1.6%	7	0.3%	4	0.3%	1	2.4%	44	0.7%
Secondary arthritis after trauma	18	0.9%	3	0.1%	0	0.0%	1	2.4%	22	0.4%
Tumor	1	0.0%	4	0.2%	0	0.0%	0	0.0%	5	0.1%
(missing)	51	2.5%	38	1.4%	17	1.5%	0	0.0%	106	1.8%
Total	2,052	100%	2,653	100%	1,148	100%	42	100%	5,895	100%

Number of Primary THRs per Type of Fixation and Age

1992-2005

Type of fixation	< 50 years		50-59 years		60-75 years		> 75 years		Total	Share
Cemented	3,176	43.0%	13,704	66.4%	73,882	94.2%	48,521	98.%	139,283	89.5%
Hybrid	1,590	21.5%	3,150	15.3%	2,596	3.3%	321	0.7%	7,657	4.9%
Uncemented	2,052	27.8%	2,653	12.9%	1,148	1.5%	42	0.1%	5,895	3.8%
Reversed Hybrid	522	7.1%	1,070	5.2%	677	0.9%	81	0.2%	2,350	1.5%
(missing)	44	0.6%	57	0.3%	127	0.2%	196	0.4%	424	0.3%
Total	7,384	100%	20,634	100%	78,430	100%	49,161	100%	155,609	100%

Number of Primary THRs per Type of Fixation and Year — Younger Than 60 Years

Type of fixation	1992-2000	2001	2002	2003	2004	2005	Total	Share
Cemented	9,707	1,540	1,526	1,463	1,436	1,208	16,880	60.2%
Hybrid	3,181	321	386	304	271	277	4,740	16.9%
Uncemented	2,386	264	341	458	546	710	4,705	16.8%
Reversed Hybrid	320	119	149	198	366	440	1,592	5.7%
(missing)	64	7	18	3	2	7	101	0.4%
Total	15,658	2,251	2,420	2,426	2,621	2,642	28,018	100%

Number of Primary THRs per Type of Fixation and Year — 60 Years or Older

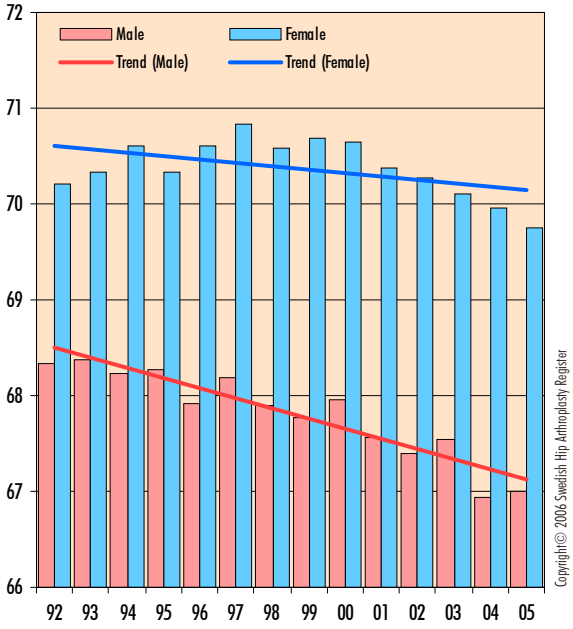
Type of fixation	1992-2000	2001	2002	2003	2004	2005	Total	Share
Cemented	72,445	9,631	9,900	9,824	10,192	10,411	122,403	95.9%
Hybrid	1,934	210	195	197	180	201	2,917	2.3%
Uncemented	423	52	86	119	212	298	1,190	0.9%
Reversed Hybrid	95	39	58	111	178	277	758	0.6%
(missing)	214	34	39	9	8	19	323	0.3%
Total	75,111	9,966	10,278	10,260	10,770	11,206	127,591	100%

Number of Primary THRs per Brand of Cement and Year

Brand of cement	1992-2000	2001	2002	2003	2004	2005	Total	Share
Palacos R + G (Gentamycin)	64,508	10,977	8,705	6,388	6,031	4,888	101,497	65.2%
Refobacin Bone Cement	1	95	2,629	4,799	5,509	6,567	19,600	12.6%
Palacos R	8,024	7	5	2	8	1	8,047	5.2%
Others	4,722	17	3	0	5	73	4,820	3.1%
CMW with Gentamycin	716	35	13	6	7	1	778	0.5%
Copal	2	6	5	9	7	10	39	0.0%
SulCem 1 with Gentamycin	6	3	4	9	4	0	26	0.0%
(completely or partly cementless)	9,793	1,044	1,288	1,466	1,817	2,292	17,700	11.4%
(missing)	2,997	33	46	7	3	16	3,102	2.0%
Total	90,769	12,217	12,698	12,686	13,391	13,848	155,609	100%

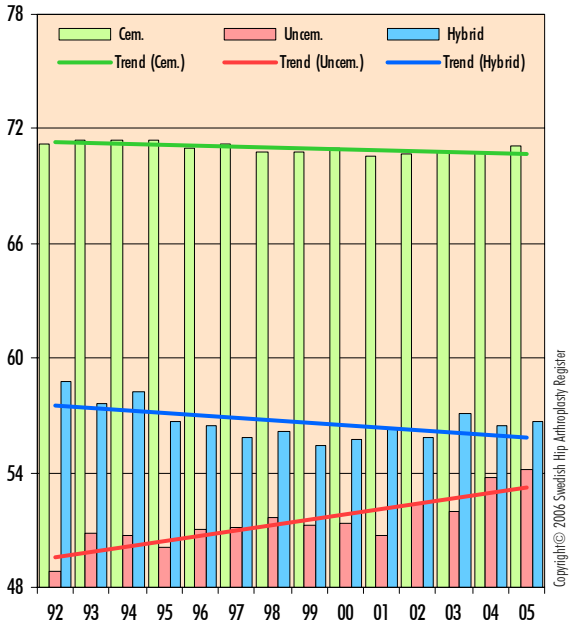
Average Age per Gender

155,185 primary THRs, 1992-2004



Average Age per Type of Fixation

155,185 primary THRs, 1992-2004



Average Age per Diagnosis and Gender

1992-2005

Diagnosis	Male	Female	Total
Fracture	73.7	76.6	75.9
Secondary osteoarthritis	67.6	73.1	71.5
Idiopathic femoral head necrosis	62.1	72.7	69.5
Primary osteoarthritis	67.9	70.0	69.1
Secondary osteoarthritis after trauma	64.2	69.8	67.1
Tumor	68.4	61.7	64.6
Inflammatory arthritis	60.4	62.4	61.9
Childhood disease	54.7	52.8	53.4
Total	67.7	70.4	69.3

Average Age per Type of Hospital and Gender

1992-2005

Type of hospital	Male	Female	Total
Rural Hospitals	68.6	70.8	69.9
Central Hospitals	67.9	70.7	69.6
University/Regional Hospitals	65.5	68.9	67.7
Private Hospitals	65.9	68.3	67.4
Total	67.7	70.4	69.3

Follow-up model for patient-related outcome

THR follow-up after four years

The standardised follow-up of all patients undergoing primary THR began on 1 January 2002. Since then, the follow-up routine has been introduced successively at more and more county councils/regions. At the present time, 53 hospitals are using the system and a further six (59 of 79 active clinics) will begin on 1 September this year. The target is that the remaining clinics will join the system before the 2006/2007 year-end. The hospitals that are and are not included are listed in the table on page 18. Unfortunately, of the ten largest THR producers, only three clinics are linked to the follow-up routine. Of eight private clinics, only one is included.

Summary of the logistics and method

As some clinics have still not joined the system, the method and objectives are repeated here. All patients complete a pre-operative questionnaire with 10 questions (Charnley category, pain VAS and EQ-5D). The same questionnaire with an additional question about satisfaction (VAS) is sent to the patient after one year. The same procedure is repeated after six and 10 years, when X-rays are also taken. A short questionnaire with six questions has been created for the radiological examination (see Annual Report 2002-2004).

Overall objectives

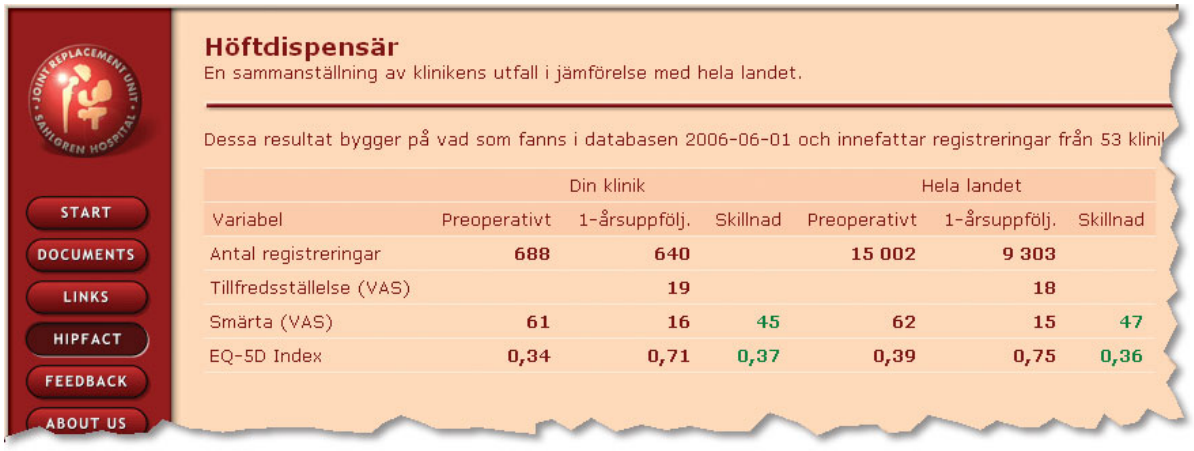
- To include patient-related outcome in the register, which will be included in national quality indicators for THR surgery
- To increase the sensitivity of the register analysis
- To identify clinically "silent" radiological changes in order to be able to intervene surgically in the event of threatening loosening and/or development of osteolysis
- To create a methodologically adequate health-economy instrument for cost-effectiveness analysis and resource allocation
- To reduce the number of routine controls after THR

Results

In June 2006, the prospective pre-operative database (53 clinics) contained 15,002 patients. The one-year follow-up comprised 9,303 patients. The prospective function is reported on line on the website. Each clinic can log in with a password and obtain its results in real time and compare them with the rest of the country. At present, mean values for all patients are reported. In the following tables (from the homepage on 1 June 2006: Sahlgrenska's results compared with the national results), the mean values for VAS pain (0-100, no pain-unbearable) and VAS satisfaction (0-100, satisfied-dissatisfied) are presented. The EQ-5D index is a weighted total value for health with a lowest value of -0.594 and a highest value of 1.0. As before, the results show that most patients are satisfied with the results and have good pain relief and that their health-related quality of life has improved considerably one year after THR.

In last year's annual report, we stated that the patient-related outcome for each clinic would be reported openly when all the units were connected to the follow-up model. We have, however, chosen to present this result this year, even though the routine is still not being used on a nationwide basis. There are several reasons for this:

1. The Swedish National Board of Health and Welfare and the SALAR are calling for greater openness from registers.
2. Pain relief, satisfaction and health benefits are the "fastest" quality indicators among the variables the register captures. For their clinical improvement programmes, the Swedish National Board of Health and Welfare and the SALAR have in fact asked the register to present faster indicators than the traditional survival analyses.
3. The EQ-5D index benefit has been selected as a national quality indicator. When all the productive units are participating, there will be an opportunity to conduct comparative health-economy analyses in which we shall be able to calculate the cost effectiveness of the participating units. Being able to calculate the cost /QALY gained for all clinics would provide an interesting future quality indicator. This could have a decisive impact on the necessary work of prioritisation and allocation.



	Din klinik			Hela landet		
Variabel	Preoperativt	1-årsuppfölj.	Skillnad	Preoperativt	1-årsuppfölj.	Skillnad
Antal registreringar	688	640		15 002	9 303	
Tillfredsställelse (VAS)		19			18	
Smärta (VAS)	61	16	45	62	15	47
EQ-5D Index	0,34	0,71	0,37	0,39	0,75	0,36

Patient-related Outcome per Hospital

2002-2005

Hospital	Preoperative				Follow-up after 1 year				EQ-5D index gained[3]	Comments
	No.	C-cat.[1]	EQ-5D	Pain	No.	EQ-5D	Pain	Satisf.[2]		
University/Regional Hospitals										
Huddinge										Will join Sep. 1, 2006
Karolinska										Will join Sep. 1, 2006
Linköping										Not joined yet
Lund	124	48%	0.28	64	70	0.72	14	13	0.44	
Malmö	79	46%	0.26	66	72	0.66	22	19	0.40	
SU/Sahlgrenska	653	49%	0.34	61	565	0.71	16	19	0.37	
SU/Östra	390	43%	0.34	64	358	0.72	19	23	0.38	
Umeå	137	49%	0.28	67	85	0.71	17	18	0.43	
Uppsala										Will join Sep. 1, 2006
Central Hospitals										
Borås	528	47%	0.41	59	402	0.74	15	19	0.33	
Danderyd	43	44%	0.44	60						
Eksjö	141	43%	0.43	62						
Eskilstuna	40	50%	0.22	67						
Falun										Not joined yet
Gävle										Joined Jan. 1, 2006
Halmstad	107	34%	0.36	65						
Helsingborg										Not joined yet
Hässleholm-Kristianstad										Not joined yet
Jönköping	184	22%	0.37	64						
Kalmar										Joined Jan. 1, 2006
Karlskrona	8	25%	0.33	43						
Karlstad										Not joined yet
Norrköping										Not joined yet
S:t Göran										Not joined yet
Skövde	320	46%	0.33	63	374	0.68	18	21	0.35	
SU/Mölndal	254	38%	0.37	62	284	0.71	17	22	0.34	
Sunderby	247	43%	0.28	68	180	0.72	16	19	0.44	
Sundsvall	270	43%	0.38	64	210	0.73	18	21	0.35	
Södersjukhuset	136	46%	0.34	64						
Uddevalla	788	46%	0.36	62	732	0.70	16	21	0.34	
Varberg	158	65%	0.46	57						
Västerås	110	43%	0.28	69						
Växjö	45	44%	0.38	55						
Ystad										Not relevant
Örebro	16	44%	0.30	61						
Östersund	454	31%	0.35	63	243	0.77	12	14	0.42	
Rural Hospitals										
Alingsås	458	46%	0.45	58	331	0.79	14	18	0.34	
Arvika										Not joined yet
Bollnäs	16	50%	0.43	68						
Enköping										Will join Sep. 1, 2006
Falköping	920	35%	0.44	59	671	0.81	12	13	0.37	
Frölunda Specialistsjukhus	142	35%	0.37	65	94	0.79	15	18	0.42	

(continued on next page)

Patient-related Outcome per Hospital (cont.)

2002-2005

Hospital	Preoperative				Follow-up after 1 year				EQ-5D index gained[3]	Comments
	No.	C-cat.[1]	EQ-5D	Pain	No.	EQ-5D	Pain	Satisf.[2]		
Gällivare	203	43%	0.38	64	127	0.75	17	20	0.37	
Hudiksvall	6	67%	0.64	52						
Kalix	112	47%	0.33	65	67	0.79	13	16	0.46	
Karlshamn	45	44%	0.36	62						
Karlskoga										Not joined yet
Katrineholm	98	45%	0.35	64						
Kungälv	678	48%	0.42	58	468	0.75	14	18	0.33	
Köping	165	31%	0.36	67						
Landskrona	203	34%	0.41	64	201	0.81	12	13	0.40	
Lidköping	457	43%	0.41	58	296	0.77	14	18	0.36	
Lindesberg	149	33%	0.47	58	45	0.89	9	9	0.42	
Ljungby	30	27%	0.40	60						
Lycksele	460	46%	0.37	65	257	0.79	13	14	0.42	
Mora										Not joined yet
Motala										Not joined yet
Norrtälje										Not joined yet
Nyköping										Not joined yet
Oskarshamn										Joined Jan. 1, 2006
Piteå	324	49%	0.35	66	165	0.73	16	23	0.38	
Simrishamn										Not relevant
Skellefteå	274	43%	0.38	64	168	0.75	13	14	0.37	
Skene	296	39%	0.40	61	238	0.78	14	18	0.38	
Sollefteå	295	40%	0.44	63	183	0.81	12	16	0.37	
Södertälje										Not joined yet
Torsby										Not joined yet
Trelleborg	691	44%	0.39	63	106	0.73	17	19	0.34	
Visby										Not joined yet
Värnamo	116	59%	0.46	57						
Västervik										Joined Jan. 1, 2006
Ängelholm										Not relevant
Örnsköldsvik	301	47%	0.37	63	193	0.77	14	16	0.40	
Private Hospitals										
Carlanderska	57	28%	0.37	62						
Elisabethsjukhuset										Will join Sep. 1, 2006
Gothenburg Medical Center										Not joined yet
Movement										Will join Sep. 1, 2006
Nacka Närsjukhus Proxima AB										Not joined yet
Ortopediska Huset										Not joined yet
Sophiahemmet										Not joined yet
Stockholms Specialistvård AB										Not joined yet
Total	11,730	43%	0.38	62	7,185	0.75	15	18	0.37	

[1] Share of Charnley category C.
[2] Satisfaction (VAS).
[3] Difference in EQ-5D after 1 year and preoperatively.

The result is presented as number of patients, mean values of pain-VAS and EQ-5D index preoperatively as well as the percentage of Charnley category C patients (i.e. patients with multiple joint disease and/or comorbidity). Hospitals with a high percentage of C-patients generally report poorer outcome both preoperatively and after 1 year. Although, the prospectively values gained are not as much affected.

Follow-up after THR – "Starting afresh"

Collaborative project with the Western Region

In last year's report, the pilot project entitled "Starting afresh" was described. It is the result of a joint venture between the Register and the Department of Strategic Development of the Western Region (WR). The final report was published in January 2006 and distributed to all the heads of departments of orthopaedics, contact physicians and decision-makers at county councils, the National Board of Health and Welfare and the SALAR. This report is available as a PDF file on the register website (in Swedish) (www.jru.orthop.gu.se). A short summary of the background, objectives, method, results and final discussion now follows.

Background

The county councils and regions have traditionally followed up their activities using productivity measurements and economic (cost) measurements. No systematic connection has been found between the actual outcome and the patient utility of activities. To enable the control and management of health and medical care, basic documentation that defines efficiency and quality is needed. The problem when it comes to Swedish health and medical care is that there is a gap between the medical and economic developments. As the financial resources available for health care are finite, prioritisation and allocation are becoming increasingly important and increasingly difficult. Cost effectiveness and the qualitative outcome of a medical intervention must be included as principles in the essential work of local, national and regional prioritisation.

Objectives

The objectives for this pilot project were to define procedure frequency, patient demographics at each hospital in the WR, complication frequency, patient utility and satisfaction, costs and cost-utility effect (cost/QALY gained) for patients undergoing THR. The ultimate objective of the project was to comply with all four cardinals of the so-called Value Compass, by following up activities in detail. For the first time ever in Sweden, this compass can be used in full to describe the outcome after treating a well-defined disease group in a region, thereby revealing the opportunities for increasing the value of the efforts health care makes on behalf of patients in the longer term; in other words, it may lead to a programme of clinical improvements.

The Strategic Development Unit in the WR has another objective. The project should be regarded as a possible model for a complete follow-up of activities. The region has expressed a wish to implement this model in other priority disease groups.

Method

The project has been carried out by merging the following databases on an encrypted individual and hospital level:

- The Register's primary database (WR part)
- The Register's re-operation database (WR part)
- The standardised follow-up database (WR part)
- VEGA (WR's case database)
- CPP (cost per patient) databases from seven of 11 hospitals

CPP stands for Cost Per Patient and is a method for calculating the cost for each individual patient and care contact. The care services and the cost of each of them are also presented. Since 1999, the SALAR has been running a programme to support the introduction of so-called CPP reporting in the health service generally and at national level. The WR has long experience of CPP reporting. The system was introduced at Sahlgrenska University Hospital back in 1985. The WR has decided to implement the complete system in the near future (2006 for institutional care). At the present time, the system has been introduced at seven of the hospitals analysed in the report. The analysis is performed on an annual basis for the years 2002-2004.

As the follow-up and early complications take between one and two years to identify and the CPP analysis is reported in complete form with a delay of more than a year, the report contains a follow-up of 2002 and 2003 in the form of a two-year aggregate. For 2004, only the procedure frequency, demographics, care data and costs are presented. This project focuses on a follow-up of the patient group which underwent total hip replacements; in other words, operations involving so-called hemi-arthroplasties (action code – ICD-10: NFB 09 and 19) are not included.

A summary of the quality indicators in the report:

- Procedure frequency/100,000 inhabitants at regional level
- Prosthesis survival at clinic and regional level – five- and ten-year results
- Short-term complications (one to two years after primary operation) per hospital which required re-operation
- Patient satisfaction and pain relief at clinic and regional level
- Patient-related health benefit one year after operation at clinic and regional level (EQ-5D index gained)
- Cost per QALY gained one year after THR operation at clinic and regional level

Availability, i.e. waiting times and the number of patients on the waiting list at each hospital, is not included as an indicator. The procedure frequency provides a good indication of the availability in the region. For several years, availability has been a focal point in Swedish health care. It is, however, only a quality indicator if the quality of availability is measured.

Results

The complete results can be found on the website (www.jru.orthop.gu.se). This summary only gives part of the results.

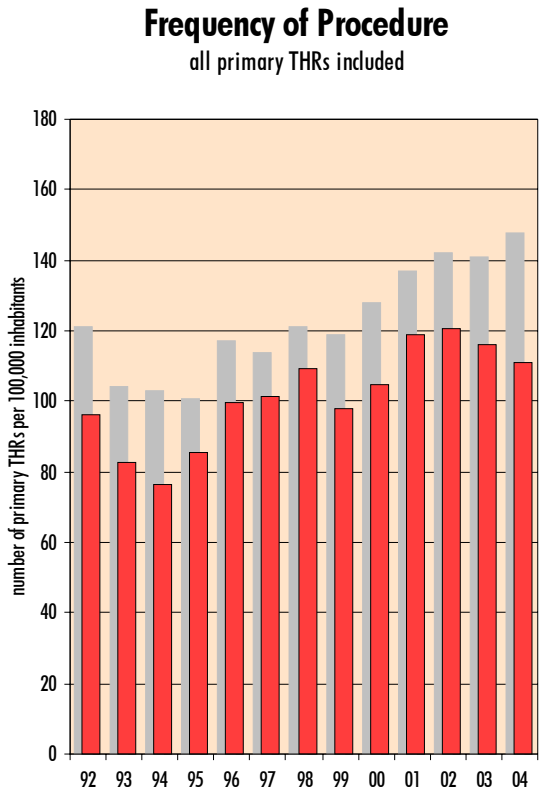
Procedure frequency. Compared with the country as a whole, the Western Region has had a low procedure frequency/100,000 inhabitants for many years. This trend has

been accentuated in recent years. The lack of resources in this important part of orthopaedics resulted in turn in the WR being the largest purchaser when it came to the free choice of care for THR surgery in 2002 and 2003. This region accounted for 32% (Annual Report 2004, page 62) of the patients who took advantage of the free choice of care during this period of time. For many years, the register has presented some central results for regions in comparison with national results. It should be noted that, in other annual reports, the WR has included northern Halland (a division that was made many years before the creation of the WR). In this report, the production of hip replacements in northern Halland (Varberg Hospital) has been excluded for the first time and the results therefore correspond, even historically, to the current WR results.

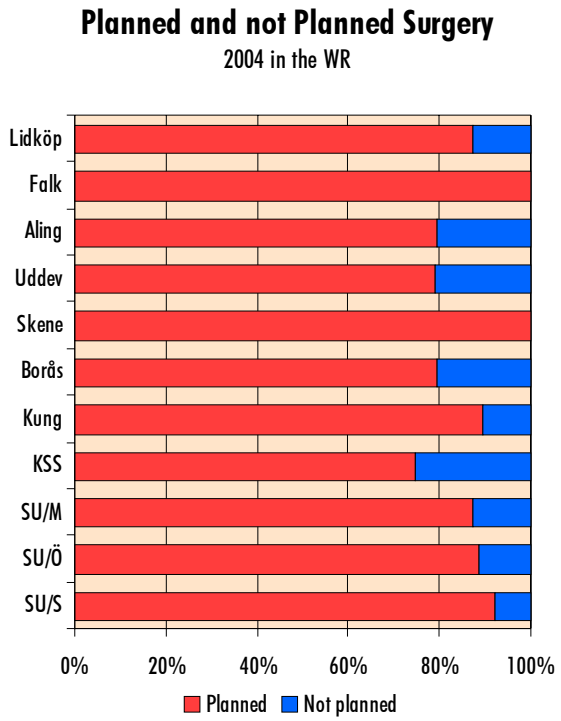
The national average for procedure frequency/100,000 inhabitants is given in the form of grey bars in the histogram. The variation in procedure frequency can be explained by an actual difference in the incidence of osteoarthritis requiring treatment, but availability probably plays a greater part. In the Western Region, the gap to the national average has been marked for many years, but it has also increased steadily in recent years.

Inclusion of hemi-arthroplasties produces incorrect statistics. Since the start in 1979, the Register has only registered operations involving total hip replacements (action codes: NFB 29, 39 and 49). The frequency of operations involving hemi-arthroplasties has increased sharply in Sweden, as a result of a new care programme for hip fractures. A dislocated cervical hip fracture is the main indication for surgery using this type of implant. The number of hemi-arthroplasties operations in Sweden has increased from around 500 a year to some 3,500 a year. In order to follow-up the quality of this surgery more effectively, the Swedish Hemi-arthroplasty Register has been initiated, as a joint venture between National Hip and the Hip Arthroplasty Register.

In conjunction with the establishment of a purchase function within Swedish health care, a number of clinics began including hemi-arthroplasties operations in their production statistics a few years ago. This “incorrect” registration has since spread to a large number of clinics and has then been included in nationwide statistics at the National Board of Health and Welfare and the SALAR. In the region’s statistics, the production of THRs in 2005 was given as just over 2,000 operations. The register reported the 2005 production of total hip replacements as 1,675. The difference is accounted for by hemi-arthroplasties, but this has now been adjusted. Following the publication of the report in January, the SALAR has also modified its statistics. Operating on patients with a dislocated cervical hip fracture primarily using a prosthesis is cost effec-



Frequency of procedure (number of operations per 100,000 inhabitants) of primary THRs in the WR 1992-2004. During the whole period the region has had a lower frequency of procedures than the rest of Sweden.



Number of planned vs. not planned primary THRs at different hospitals in the WR 2004. ”Not planned” THRs are mostly patients operated due to the diagnosis (ICD10) S72.00, i.e. patients with cervical hip fracture. This procedure constitutes 20-30% of the whole production at some hospitals in the WR. Hip fracture as an indication for THR surgery in the rest of Sweden was 11% 2004.

tive and often helps patients avoid fracture complications and the need for re-operations. This has been demonstrated in a number of Swedish doctoral dissertations. In spite of this, it has still not been established whether hemi-arthroplasties or total hip replacements are the optimal method. A number of clinics in the Western Region have extended the indication of acute ***total*** hip replacement as a treatment method for dislocated hip fractures.

The above discussion about THRs in connection with hip fractures and the inclusion of hemi-arthroplasties in the procedure statistics clearly demonstrates that the region has "pushed aside" patients with chronic hip disease from availability in the region.

Patient-related outcome, short-term complications and prosthesis survival. These variables are reported for the entire country in separate tables. In the WR, three clinics had more than 2% short-term complications, which led to in-depth analyses at these units.

Cost and QALY analysis. A table presenting the cost result (charging) for THR operations (by care period, i.e. any aftercare is included) for the different hospitals in the WR in 2004 follows.

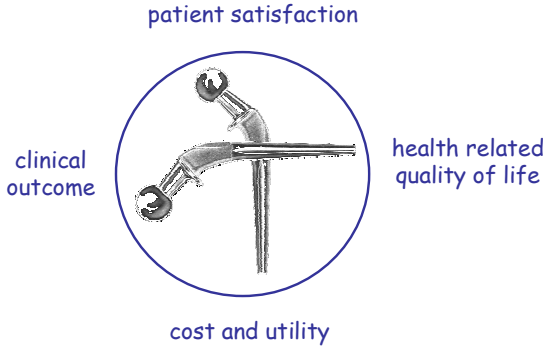
The CPP result (mean value) varied from SEK 89,793 to SEK 115,672 between the different hospitals. This variability was largely due to the varying patient demographics at the hospitals. Clinics that operate on a large percentage of problem cases and patients who are more ill obtain a high CPP mean value, i.e. co-morbidity drives up costs (see the section on case-mix).

The QALY calculations (see the report for details) reveal what is in principle perhaps the most important result in the report: it is not always the "least expensive" clinics that have the best cost effectiveness. A high value on the EQ-5D index can compensate for a high CPP value (cost), which in turn means that the utility of the expensive intervention must be measured to produce a fair picture of a follow-up.

Summary

Merging different databases within health and medical care should be easier in the future, as centrally controlled projects, designed to create a common, standardised information structure, are in progress. During the project, it has become increasingly obvious that it is essential for both representatives of the profession and the owners (WR) should have the right to make interpretations before reports of this type are published.

The delay in the presentation of the results can be criticised, but a follow-up in this medical area, with the selected quality indicators (patient-related outcome, short-term complications and CPP), takes between one and two years. If an attempt is made to present a report on the previous year in January, it is only possible, in the case of THR surgery, to report the procedure frequency without capturing the outcome. This pilot project has been run to demonstrate the potential and benefit of using existing databases and then merging them to produce a more satisfactory follow-up than has previously been possible. The project has been able to produce results in all the cardinals on the Value Compass and a "hip compass" has been created for THR surgery in the WR.



Improvements

The value compass is comparable to a balanced score card. In other words, there is theoretical improvement potential in all four "cardinals". The additional development of surgical techniques and prosthesis design could further improve the long-term survival of the implanted prosthesis (west). The benefit for standard patients, however, may be only marginal, as 10-year survival is already around 95%. Patient satisfaction (north) and health benefits (east) could definitely be improved if well-planned, standardised patient information about the expected results and the time perspective in terms of optimal post-operative function were introduced. Optimised post-operative pain relief and standardised rehabilitation would also improve the level of satisfaction and self-assessed health benefits. Finally, it goes without saying that costs (south) could be reduced in many areas using rational measures (even if they must not be allowed to affect the quality of the results). If the outcome in both the "easterly" and "southerly" directions could be improved in the future, this would produce an obvious improvement in cost utility.

Validation

Merging the Hip Arthroplasty Register with the VEGA database produced a spin-off – the validation of the individual databases. For many years, this has been a nationwide register. Previous validations have revealed that almost 100% of primary THRs have been reported. During the three-year study period, some 1% of cases have been missing from the VEGA database. This is illustrated by the fact that 1,741 total hip replacements were registered in 2003 in the register database, of which 1,720 were in VEGA (i.e. a difference of 21 cases (1,2%). An analysis revealed that one hospital accounted for the majority of "incorrectly registered cases" during the entire three-year period. The most common reason was the wrong action code in the surgical report.

Hospital	Share C-patients 1 year (%)	Relief of pain VAS	EQ-5D – index value gained	CPP median	QALY cost 1 year	QALY cost 10 years
SU/Sahlgrenska	48	46	0.40	100,700	251,700	25,170
SU/Östra	51	41	0.35	83,400	238,300	23,830
SU/Mölndal	48	46	0.43	94,100	218,800	21,880
Skövde	62	52	0.46	89,100	193,700	19,370
Kungälv	46	43	0.34	72,400	212,900	21,290
Falköping	38	47	0.40	79,500	198,750	19,875
Lidköping	47	42	0.34	83,200	244,700	24,470

Patient-related outcome 1 year postoperatively indicated as gained value for VAS-pain (pain relief) and EQ-5D-index as well as CPP (median) and cost per QALY gained. 10-year QALY-cost is not discounted (revisions not included). Study years 2002 and 2003.

Hospital	Share C-patients 1 year (%)	Relief of pain VAS	EQ-5D – index value gained	DRG-price	QALY cost 1 year	QALY cost 10 years
Borås	47	46	0.40	*99,000*	*247,500*	*24,750*
Skene	46	45	0.38	*99,000*	*260,500*	*26,500*
Uddevalla	54	47	0.38	*97,200*	*255,800*	*25,580*
Alingsås	44	47	0.34	*97,100*	*285,600*	*28,560*

Patient-related outcome 1 year postoperatively indicated as pain relief (delta value for pain-VAS) and EQ-5D-index gained as well as DRG-price and cost per QALY gained. During the study years these hospitals had not implemented CPP. Study years 2002 and 2003.

Hospital	Numbers operated	CPP median	CPP mean value	Distribution	Invoiced amount (replaces DRG)
Western Region	1,675	95,310	103,755	41,230 – 482,082	-
SU/Sahlgrenska	201	102,209	114,488	68,678 – 280,307	94,000
SU/Östra	98	86,543	97,002	46,695 – 238,020	94,000
SU/Mölndal	88	97,610	115,050	41,229 – 482,082	94,000
Skövde	149	102,947	115,672	70,368 – 311,564	90,547
Kungälv	123	86,133	89,793	59,329 – 150,666	95,000
Borås	198	not CPP	not CPP	-	93,613
Skene	87	not CPP	not CPP	-	93,613
Uddevalla	255	not CPP	not CPP	-	95,400
Alingsås	146	not CPP	not CPP	-	97,000
Falköping	213	93,698	96,236	68,841 – 200,490	90,547
Lidköping	117	97,899	101,440	72,808 – 197,299	90,547

Cost results – charging for operated hip prosthesis by care period per hospital in the WR 2004.

Implant survival as a quality indicator

Implant survival as a quality indicator has been presented in the last few annual reports. As 10-year survival per county council/region is now being used as a national quality indicator (see the separate section), we have changed the graphic presentation so that it matches the presentation the Swedish Board of Health and Welfare and the SALAR publish in the report entitled *"Open comparisons in 2006 of health care quality and effectiveness"*.

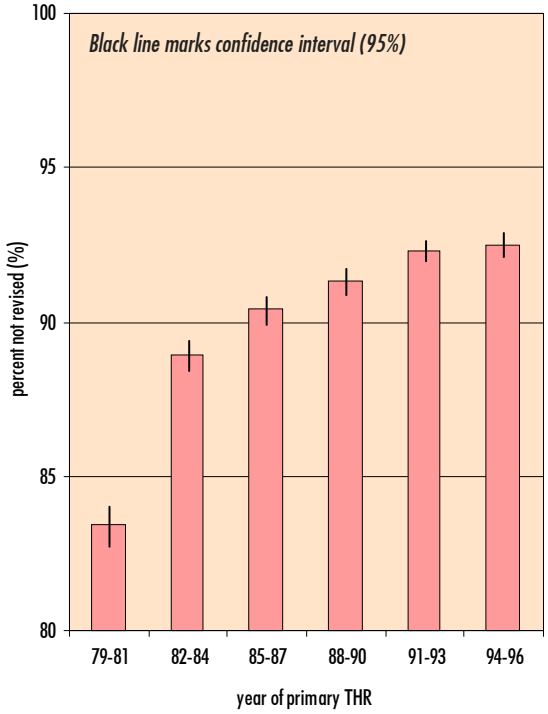
The following table shows the national 10-year survival for all patients undergoing surgery involving primary THRs. The definition of failure is the revision of one or both prosthesis components and the extraction of the prosthesis. All causes of revision are included.

As the histogram and the table clearly show, the 10-year survival of hip implants has improved successively in Sweden since the Register was introduced.

The following histogram shows the 10-year survival for each hospital. The table comprises the 70 clinics (the active clinics that had 10-year results on 31 December 2005). The histogram is a graphical presentation of the 10-year results from the table on pages 54-55. The observation period is 1992-2005. The national average was 92.7% ± 0.3%.

The red bars are clinics whose upper confidence interval is below the national lower confidence interval; in other words, clinics which with 95% confidence had poorer implant survival after 10 years than the national average. Thirteen clinics therefore had a result that was poorer than the national average, which means that the 10-year survival of prostheses at 81% of the clinics was as good as or better than the national average. When interpreting these figures, every clinic's patient demographics – case-mix – should be taken into account (see the separate section).

Implant Survival after 10 Years in Different Time Periods

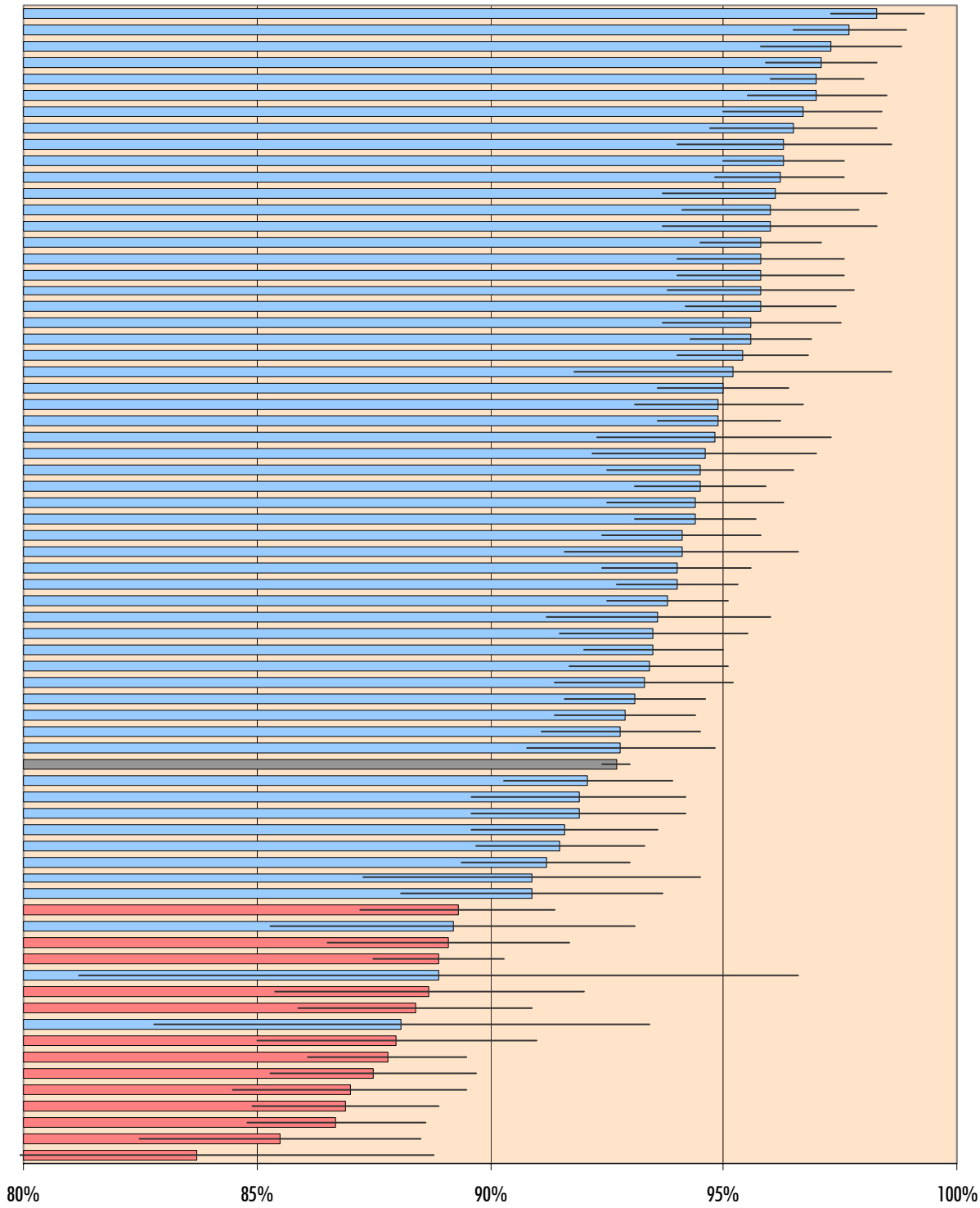


Time period	10 years	95% CI
1979-1981	83.4%	±0.7%
1982-1984	88.9%	±0.5%
1985-1987	90.4%	±0.5%
1988-1990	91.3%	±0.4%
1991-1993	92.3%	±0.3%
1994-1996	92.5%	±0.4%

Average 10-year implant survival for all hospitals being active in each time period. Each time period comprises all primary THRs performed during the 3-year-period. All types of revisions are included. The analysis goes to December 31, 2005.

Implant Survival after 10 Years

each bar represents one hospital, primary THRs 1992-2005



10-year implant survival per hospital. The grey bar represents the national average. Red bars represent hospitals with significantly worse results.

Re-operation

The term re-operation comprises all types of surgical procedure after the primary operation. These procedures have been registered since the start in 1979. In the middle of 2000, we stopped registering and reporting closed reduction after implant dislocation and this must be borne in mind when making comparisons with reports up to 2002. Re-operations have been categorised in three groups: revision involving the exchange or extraction of implant components, major surgical intervention and minor surgical intervention without the extraction of the implant or any of its components.

Since 2003 and first and foremost in 2004, the number of re-operations was reduced by just under 200 procedures (approximately 11%). Between 2003 and 2004, the reduction was primarily caused by the fact that fewer cases of implant loosening without simultaneous infection were the subject of re-operation, while the reduction between 2004 and 2005 was mainly due to fewer re-operations as a result of dislocation. Early re-operations as a result of dislocation are an important quality indicator. Last year, we therefore conducted a separate analysis to find the causes of this problem (see Annual Report 2004). In 2005, we noted a decline in these re-operations and this indicates that the profession is taking the problem seriously and is taking effective action. As before, aseptic loosening is still the dominant reason for re-operations, but, since the peak in 2002, the number of re-operations due to loosening has fallen by 202 procedures (18%), which is a strikingly large decrease. Provided that this reflects a true decline in the number of mechanical complications requiring re-operation, this indicates that the overall quality of the procedure has been improved, with significant cost savings for both society and the health service. It is important that the quality of this information is assured in the future using data from the follow-up model in order to avoid the possibility of shifts in indication. Since 2001, the number of re-operations as a result of fractures has been surprisingly constant (161-165 operations a year). This indicates that we do not generally keep patients waiting an excessively long time. Increasing bone loss around loose implants which are not revised in time would otherwise have resulted in an increase in the number of re-operations due to fractures, but as yet this is not the case. The number of re-operations for technical reasons almost doubled in 2004, but it has declined slightly, but not to the same levels as those that were seen before 2004.

Number of Reoperations per Procedure and Year

primary THRs 1979-2005

Procedure at reoperation	1979-2000	2001	2002	2003	2004	2005	Total	Share
Exchange of cup and/or stem or extraction	17,715	1,571	1,656	1,691	1,591	1,523	25,747	85.6%
Major surgical intervention	2,245	158	168	149	151	122	2,993	10.0%
Minor surgical intervention	758	90	97	104	157	106	1,312	4.4%
(missing)	9	0	2	1	3	0	15	0.0%
Total	20,727	1,819	1,923	1,945	1,902	1,751	30,067	100%

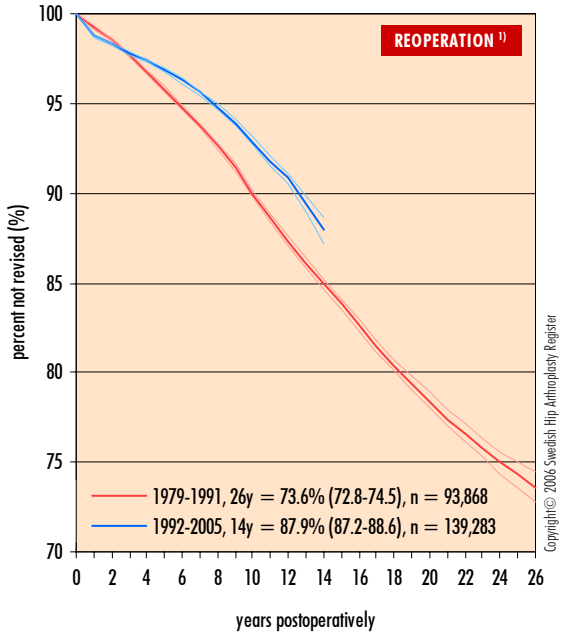
Number of Reoperations per Reason and Year

primary THRs 1979-2005

Reason for reoperation	1979-2000	2001	2002	2003	2004	2005	Total	Share
Aseptic loosening	12,592	1,091	1,138	1,093	938	936	17,788	59.2%
Dislocation	2,101	234	242	255	309	243	3,384	11.3%
Deep infection	1,710	124	180	220	243	201	2,678	8.9%
Fracture	1,324	164	161	165	165	162	2,141	7.1%
2-stage procedure	823	76	83	105	98	92	1,277	4.2%
Miscellaneous	811	78	64	36	49	46	1,084	3.6%
Technical error	789	16	26	27	51	40	949	3.2%
Implant fracture	288	30	20	34	33	19	424	1.4%
Pain only	254	6	8	9	15	8	300	1.0%
Secondary infection	0	0	0	0	1	1	2	0.0%
(missing)	35	0	1	1	0	3	40	0.1%
Total	20,727	1,819	1,923	1,945	1,902	1,751	30,067	100%

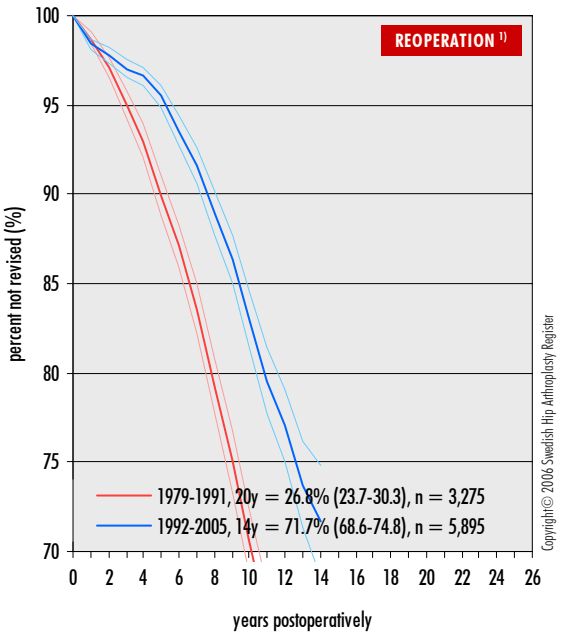
All Cemented Implants

all diagnoses and all reasons



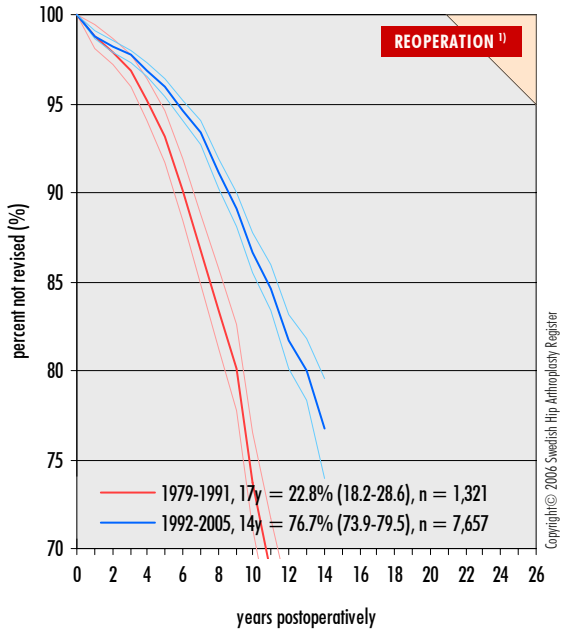
All Uncemented Implants

all diagnoses and all reasons



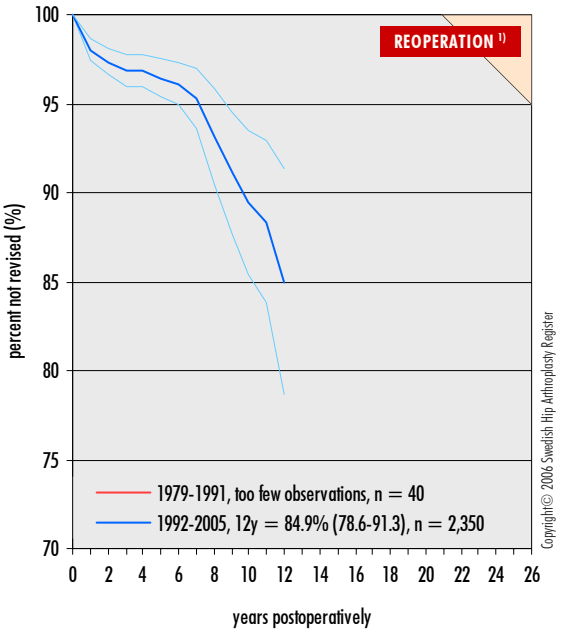
All Hybrid Implants

all diagnoses and all reasons



All Reversed Hybrid Implants

all diagnoses and all reasons



1) Survival statistics according to Kaplan-Meier with revision and removal as end-point for failure.

Short-term complications – a new openly reported variable

Background

In every report, the register has reported prosthesis survival using what is known as survival analysis. The definition of "failure" is the replacement of some prosthesis components or the extraction of the entire prosthesis. For many years, this parameter has been used both internationally and nationally within implant surgery, first and foremost as a comparative variable in long-term follow-up. One of the disadvantages of this methodology is its slowness combined with the historical perspective. All registers search for variables that can provide rapid feedback to individual clinics and can initiate clinical improvement programmes without excessively long delays.

Starting with this report, short-term complications will be published as a faster variable. All the heads of clinics and contact physicians have been informed of this and the National Board of Health and Welfare has chosen short-term complications at each county council as a national quality indicator following hip replacement surgery.

Definition

Short-term complications are every form of open re-operation (i.e. not just revisions or prosthesis extractions) within two years of the primary operation. The last four-year period is studied – in this report, from 2002 up to and including 2005.

The number of early re-operations per clinic is presented both in total and in four main groups: infection, dislocation, loosening and other causes. This information should be seen against the background of the clinic's assignment when it comes to patient selection or case-mix and the scope of any training programmes. These data enable comparisons between clinics with a similar profile and improve the opportunity for continuous improvements.

The follow-up period is short and primarily reflects early and serious post-operative complications, such as deep infection and revision as a result of recurring dislocations. It should be noted that the report refers to complications that are treated surgically. Infections treated with antibiotics and conservatively (non-surgically) treated dislocations are not included in the register. Patients who undergo surgery on several occasions, as a result of the same complication, are listed as one complication. However, a number of patients undergo re-operations for different reasons within a short period. Patients undergoing re-operations at clinics other than the primary clinic are nonetheless ascribed to the primary clinic.

Results

The results are given in the following table. Hospital type, number of primary operations during the observation period and the number of re-operations are given. The rate of complications varies from 0-4.8%.

It should be noted that case-mix factors are not included in this table. As has previously been stated, we are planning to further develop a case-mix factor that can be expressed as a value which will be included in next year's table.

Discussion

The number of complications is small and should be evaluated with care. This variable can actually only be evaluated over time; in other words, if there are clear trends. Clinics that adopt a wait-and-see policy – in other words, avoid operating on these complications – will not be registered in the database.

Patient demographics probably influence the number of short-term complications. Clinics that operate on the most serious cases with a higher risk of complications may have a higher frequency of short-term complications. If a clinic continues to report a high rate of short-term complications over a longer period, an in-depth analysis reviewing routines, surgical techniques and possible implant selection should be initiated.

The main aim of this openly reported indicator is not to "accuse" individual clinics but to initiate rapid improvement programmes. Experience from the National HIA (Register of Information and Knowledge about Swedish Heart Intensive care Admissions) and NDR (National Diabetes Register) is excellent and has produced a rapid improvement effect at the clinics that have had deviating and poorer results.

Reoperation within 2 Years per Hospital

2002-2005

	Prim. THRs	Patients [1)]		Infection		Dislocation		Loosening		Other	
Hospital	number	number	%	number	%	number	%	number	%	number	%
University/Regional Hospitals											
Huddinge	845	12	1.4%	0	0.0%	6	0.7%	2	0.2%	5	0.6%
Karolinska	1,144	38	3.3%	17	1.5%	14	1.2%	3	0.3%	16	1.4%
Linköping	655	5	0.8%	3	0.5%	1	0.2%	0	0.0%	2	0.3%
Lund	386	9	2.3%	1	0.3%	4	1.0%	1	0.3%	4	1.0%
Malmö	488	9	1.8%	2	0.4%	6	1.2%	0	0.0%	1	0.2%
SU/Sahlgrenska	831	16	1.9%	7	0.8%	1	0.1%	3	0.4%	9	1.1%
SU/Östra	480	2	0.4%	0	0.0%	2	0.4%	0	0.0%	0	0.0%
Umeå	255	5	2.0%	0	0.0%	2	0.8%	0	0.0%	4	1.6%
Uppsala	1,102	33	3.0%	13	1.2%	10	0.9%	2	0.2%	12	1.1%
Central Hospitals											
Borås	710	22	3.1%	4	0.6%	15	2.1%	0	0.0%	6	0.8%
Danderyd	1,295	28	2.2%	4	0.3%	14	1.1%	4	0.3%	11	0.8%
Eksjö	708	16	2.3%	4	0.6%	4	0.6%	1	0.1%	9	1.3%
Eskilstuna	281	2	0.7%	0	0.0%	0	0.0%	0	0.0%	2	0.7%
Falun	984	7	0.7%	1	0.1%	3	0.3%	2	0.2%	1	0.1%
Gävle	701	21	3.0%	3	0.4%	11	1.6%	1	0.1%	6	0.9%
Halmstad	713	17	2.4%	9	1.3%	7	1.0%	0	0.0%	7	1.0%
Helsingborg	449	2	0.4%	1	0.2%	0	0.0%	0	0.0%	2	0.4%
Hässleholm-Kristianstad	2,444	24	1.0%	15	0.6%	4	0.2%	2	0.1%	16	0.7%
Jönköping	731	14	1.9%	1	0.1%	12	1.6%	0	0.0%	2	0.3%
Kalmar	849	14	1.6%	8	0.9%	6	0.7%	0	0.0%	3	0.4%
Karlskrona	165	1	0.6%	0	0.0%	0	0.0%	1	0.6%	0	0.0%
Karlstad	834	22	2.6%	16	1.9%	4	0.5%	2	0.2%	7	0.8%
Norrköping	810	7	0.9%	0	0.0%	5	0.6%	1	0.1%	1	0.1%
S:t Göran	1,887	47	2.5%	20	1.1%	15	0.8%	9	0.5%	15	0.8%
Skövde	626	7	1.1%	2	0.3%	1	0.2%	0	0.0%	5	0.8%
SU/Mölndal	421	5	1.2%	1	0,.%	2	0.5%	0	0.0%	3	0.7%
Sunderby	525	15	2.9%	9	1.7%	5	1.0%	1	0.2%	3	0.6%
Sundsvall	688	33	4.8%	9	1.3%	19	2.8%	1	0.1%	7	1.0%
Södersjukhuset	954	9	0.9%	0	0.0%	4	0.4%	2	0.2%	3	0.3%
Uddevalla	1,158	20	1.7%	8	0.7%	9	0.8%	2	0.2%	5	0.4%
Varberg	758	17	2.2%	15	2.0%	0	0.0%	1	0.1%	4	0.5%
Västerås	462	4	0.9%	0	0.0%	3	0.6%	0	0.0%	1	0.2%
Växjö	425	3	0.7%	0	0.0%	2	0.5%	0	0.0%	1	0.2%
Ystad	380	10	2.6%	1	0.3%	8	2.1%	0	0.0%	1	0.3%
Örebro	732	7	1.0%	4	0.5%	0	0.0%	0	0.0%	3	0.4%
Östersund	681	9	1.3%	2	0.3%	3	0.4%	0	0.0%	4	0.6%
Rural Hospitals											
Alingsås	560	3	0.5%	1	0.2%	2	0.4%	0	0.0%	0	0.0%
Arvika	327	5	1.5%	4	1.2%	0	0.0%	0	0.0%	2	0.6%
Bollnäs	851	13	1.5%	1	0.1%	6	0.7%	2	0.2%	4	0.5%
Enköping	601	14	2.3%	8	1.3%	5	0.8%	2	0.3%	3	0.5%
Falköping	923	6	0.7%	1	0.1%	3	0.3%	1	0.1%	2	0.2%
Frölunda Specialistsjukhus	144	2	1.4%	1	0.7%	1	0.7%	0	0.0%	1	0.7%

(continued on next page)

Reoperation within 2 Years per Hospital (cont.)

2002-2005

	Prim. THRs	Patients [1]		Infection		Dislocation		Loosening		Other	
Hospital	number	number	%	number	%	number	%	number	%	number	%
Gällivare	400	8	2.0%	4	1.0%	3	0.8%	0	0.0%	2	0.5%
Hudiksvall	640	20	3.1%	9	1.4%	11	1.7%	0	0.0%	3	0.5%
Karlshamn	654	7	1.1%	0	0.0%	5	0.8%	1	0.2%	1	0.2%
Karlskoga	492	7	1.4%	2	0.4%	4	0.8%	1	0.2%	3	0.6%
Katrineholm	830	7	0.8%	2	0.2%	1	0.1%	4	0.5%	4	0.5%
Kungälv	726	1	0.1%	1	0.1%	0	0.0%	0	0.0%	0	0.0%
Köping	806	1	0.1%	0	0.0%	1	0.1%	0	0.0%	1	0.1%
Lidköping	480	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Lindesberg	552	7	1.3%	2	0.4%	4	0.7%	0	0.0%	2	0.4%
Ljungby	438	2	0.5%	0	0.0%	0	0.0%	1	0.2%	1	0.2%
Lycksele	882	1	0.1%	0	0.0%	0	0.0%	1	0.1%	0	0.0%
Mora	574	6	1.0%	2	0.3%	3	0.5%	0	0.0%	1	0.2%
Motala	958	8	0.8%	1	0.1%	6	0.6%	0	0.0%	1	0.1%
Norrtälje	402	9	2.2%	4	1.0%	6	1.5%	0	0.0%	4	1.0%
Nyköping	520	11	2.1%	4	0.8%	6	1.2%	0	0.0%	5	1.0%
Oskarshamn	541	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Piteå	510	5	1.0%	2	0.4%	1	0.2%	0	0.0%	2	0.4%
Simrishamn	759	7	0.9%	1	0.1%	3	0.4%	1	0.1%	2	0.3%
Skellefteå	547	6	1.1%	2	0.4%	3	0.5%	1	0.2%	3	0.5%
Skene	330	1	0.3%	0	0.0%	1	0.3%	1	0.3%	0	0.0%
Sollefteå	540	6	1.1%	3	0.6%	1	0.2%	0	0.0%	4	0.7%
Södertälje	502	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Torsby	278	1	0.4%	0	0.0%	1	0.4%	0	0.0%	0	0.0%
Trelleborg	1,015	13	1.3%	1	0.1%	6	0.6%	3	0.3%	3	0.3%
Visby	254	4	1.6%	0	0.0%	1	0.4%	1	0.4%	2	0.8%
Värnamo	466	4	0.9%	2	0.4%	3	0.6%	0	0.0%	2	0.4%
Västervik	454	10	2.2%	5	1.1%	5	1.1%	0	0.0%	3	0.7%
Ängelholm	493	4	0.8%	1	0.2%	1	0.2%	0	0.0%	2	0.4%
Örnsköldsvik	531	7	1.3%	3	0.6%	3	0.6%	0	0.0%	2	0.4%
Private Hospitals											
Carlanderska	221	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Elisabethsjukhuset	338	4	1.2%	1	0.3%	0	0.0%	0	0.0%	3	0.9%
Gothenburg Medical Center	59	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Movement	104	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Nacka Närsjukhus Proxima	17	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Ortopediska Huset	864	5	0.6%	1	0.1%	1	0.1%	3	0.3%	1	0.1%
Sophiahemmet	943	9	1.0%	1	0.1%	5	0.5%	1	0.1%	2	0.2%
Stockholms Specialistvård	572	9	1.6%	3	0.5%	5	0.9%	1	0.2%	2	0.3%
Sweden	52,623	763	1.4%	259	0.5%	313	0.6%	69	0.1%	266	0.5%

1) The number of patients with short-term complications can differ from the number of complications, as each patient can have more than one type of complication.

Revision

In contrast to re-operation, which is a broader concept, the term "revision" is used for the exchange or extraction of one, several or all the parts of the prosthesis. During the period 1979-1991, the data for primary hip arthroplasty were registered as an aggregate for each hospital and were not based on the patients' personal identity numbers. Approximations for diagnosis, gender and age distribution and mortality risk statistics were therefore used for survival calculations, which demonstrated a high level of validity (Söderman et al. 2000). In 1992, a more precise system based on the patient's personal identity number was introduced. Using this system, more information about each primary procedure is also registered, making a more complete analysis possible.

In this year's report, we have conducted an in-depth analysis of two areas. In the first, we have taken advantage of the opportunity to relate outcome to the final prosthesis design, as every implant component has been registered using an article number. As this registration began in 1999, the analysis covers the period 1999 to 2005 and can only comprise the early outcome. Only the three most common cemented stem types (Lubinus SP II, Exeter polished and Spectron EF Primary) have been included to obtain sufficiently extensive material for reliable conclusions. During every operation, the size of the stem, the length of the neck and, in some cases, also the offset angle are adjusted for every patient. This creates the potential for a very large number of implant component combinations for one and the same basic prosthesis model. Important information, such as the fact that some implant sizes or combinations represent an increased risk of early problems which could lead to re-operations, may be concealed behind the survival curve. In this year's report, we have attempted to analyse whether any of these design-related factors impact the risk of early re-operation caused by the mechanical loosening of cups and/or stems.

Patients undergoing revision for the first time constitute the other area that has been the subject of an in-depth analysis. The aim here was to investigate the degree to which these patients' problems can be resolved using a new surgical intervention.

In the overall reports, we can see that the reduction in the number of re-operations due to dislocation in 2005 was also reflected in the form of a reduction in the procedure frequency of revisions. When it comes to the other reasons for revision, no striking changes have taken place. Since 2000, the number of patients undergoing multiple revisions – i.e. those who had previously undergone a revision and then underwent another – has been relatively constant, just over 300 a year. These are primarily patients with inflammatory joint disease and sequelae from childhood illness, as well as patients experiencing deep infection and dislocation.

During the past three years, the procedure frequency for the revision of primary fully cemented and uncemented implants has declined. As expected, the number of revisions due to dislocation, deep infection and technical problems has decreased with time following the primary operation when the whole period (1979-2005) is studied. The risk of revision as a result of mechanical loosening reaches a plateau when seven to ten years have passed following the primary operation. The relative percentage of revisions as a result of fractures presents another picture and is relatively constant at 5-6% up to 10 years, after which it increases. This pattern could be due to the fact that many patients with loose prostheses are not detected in time. There may also be other reasons. In the future, thanks to our follow-up programmes, we shall have a better grasp of this problem and will probably be able to reduce the need for complicated revisions of periprosthetic fractures.

Prosthesis survival related to fixation type reveals an unchanged pattern compared with previous years and regardless of whether all diagnoses are included or whether patients who undergo primary surgery as a result of osteoarthritis are analysed. These diagrams should be regarded as a description of the current situation in Sweden. A 26-year survival of 77.6% of 69,462 cemented prostheses constitutes important documentation on the procedure as such and is a reference for both ongoing and future studies. It should be pointed out that these data are not sufficient for a more detailed comparison of the different ways of fixing prostheses, as many factors, such as demographic differences between groups, changes in indication over time and changes in implant design, have not been taken into account. The survival diagram for reversed hybrids reveals a sharp increase in the number of revisions after eight years. This should be seen against the background of the fact that, in 1992-1998, a total of just 218 reversed hybrid operations were performed, an uncertainty that is reflected in the large confidence interval.

As before, the overall results have improved during the past 12-13 years. In the event of a successive improvement in uncemented implants, the peak in the curve, which currently occurs at around four to five years, should shift to the right and signify that modern, relatively recently inserted prosthesis designs are less frequently the subject of revision. A tendency in this direction can already be seen, which is encouraging. When interpreting the survival curve for reversed hybrids, the fact that few hybrids have been followed up for more than six to seven years should be taken into account.

The implant-specific survival diagrams (pages 42-45) are based on revisions regardless of cause and independent of diagnosis. Four survival curves showing the risk of stem and/or cup revision are only shown for the four most frequently used cemented implants. In the other diagrams, cups and stems are shown separately. The analysis is completed when the number of observations is less than 50. A more detailed presentation of different implants is given in tabular form, starting on page 50. The continuous feedback from the register has resulted in an increasingly narrow implant selection. As a result, we are now standing on safer ground when it comes to the documentation of some cemented/uncemented prosthesis

concepts. Recurring analyses of how the choice of cemented/uncemented prosthesis influences the outcome for different patient categories are needed in order to determine whether this is an important factor and, if so, to define the optimal indicators for each fixation method.

The results for different gender and age groups are presented in four intervals: younger than 50 years, 50-59 years, 60-75 years and older than 75 years. For each age interval, all observations, cemented, uncemented and hybrid implants, are presented for each gender. All the reasons for revision are included for the period on which the report is based (1992-2005).

In the age group younger than 50 years, women have poorer results than men, probably owing to the dominance of women in the diagnostic groups sequelae from childhood diseases and inflammatory joint disease, two diagnoses with an increased revision rate. For both men and women, the results improve if cemented fixation is used instead of uncemented or hybrid fixation. In the 50-59 age group, cemented fixation still represents a lower risk of revision among women. In men, 14-year prosthesis survival is highest for uncemented fixation, but the confidence intervals for fully uncemented and cemented fixation overlap one another. In the next age interval (60-75), it is difficult to evaluate the comparison, as a result of the relatively small number of observations in the uncemented group. The choice of hybrid prostheses does not produce any improvement, regardless of age group. In women in the 60-75 age group, hybrids appear to be far worse, but a more in-depth analysis is needed to confirm this difference.

In last year's report, we introduced a so-called patient profile or case-mix indicator, based on the age of patients in conjunction with the primary operation and diagnosis. We found that patients in the 60-75 age group who underwent surgery because of primary osteoarthritis experienced a more favourable outcome than other age groups with the same diagnosis, together with patients who underwent surgery for diagnoses other than primary osteoarthritis, regardless of age. A simple definition of patient profile is needed in order to understand how much of the health service's resources in the form of care, degree of surgical difficulty and post-operative course are consumed in conjunction with the intervention and how the anticipated result is affected. We believe that the patient profile can be defined even more effectively and are planning to present an updated analysis in the next report. On pages 54-55 in this year's report, we show the percentage of patients operated on for primary osteoarthritis and the percentage of patients in the 60-75 age group for each clinic. As the table shows, these patient categories are most common at private and rural hospitals and less common at central and university/regional hospitals. The differences between hospitals in the three largest categories are large and lie between 22% and 26%. In the case of private hospitals, there is less variation, but it is still 12%.

For three of the four most frequently used cemented cup/stem combinations during the period 1992-2005, the stem has a better result than the corresponding cup. The Charnley implant breaks this pattern and this is probably one of the contributory factors that has led to the Charnley cup being used almost exclusively with other stem designs and the Charnley stem disappearing almost completely from the Swedish market. The reason why the survival of the Reflection cup (all polyethylene) is somewhat poorer is unclear. Increased wear (in RSA studies) to the specific polyethylene cup that has been used in the majority of cases has been demonstrated and this could be one of the reasons.

For the four most frequently used uncemented implant combinations, the stem is functioning effectively, with a nine- to 13-year survival of 96.7% or more. In the case of the uncemented cups, survival declines towards the end of the interval, probably as a result of wear problems and osteolysis. During the first half of the 1990s, the liner for the Trilogy was supplied in some cases with an older type of sterilisation and the addition of stearate and this may have affected the outcome. The introduction of high-molecular plastic (highly cross linked) in recent years can be expected to have a positive impact on outcome. There are now two different studies with five-year follow-up that report a sharp reduction in wear using two different types of high-molecular plastic. This may be one of the most important advances in prosthesis surgery for many years. It should, however, be pointed out that there are many different types of this polyethylene and that some have no clinical documentation whatsoever. As these plastics often have somewhat poorer strength, the use of implants that are thinner than 6-8 mm should definitely be avoided until long-term documentation is available. We feel that high-molecular plastic can be used in patients in whom a high level of wear is expected. In spite of this, the follow-up period is short and there is still no basis for a general recommendation.

Cemented stem design and early aseptic loosening

During the 1990s, a number of implant manufacturers changed their standard implants, sometimes by simply adding more sizes, but other variation opportunities, such as the choice of neck angle (CCD) and offset, were often also introduced. Some manufacturers also decided to abandon a fixed standard length regardless of thickness and instead scaled down the stem symmetrically, as the size was reduced. On the basis of previous experience, we know that small changes to an implant could result in major differences when it comes to the risk of revision. One well-known example is the Exeter implant, which demonstrated far poorer results when it was given a matt surface. Preliminary studies using radiostereometry indicate that stem migration can differ depending on the implant size that has been used. In several parts of Sweden, anxiety has also been expressed about the fact that the relatively recently introduced small prosthesis sizes that have been cemented in place have experienced early mechanical loosing to an increasing degree.

Since 1999, the Hip Arthroplasty Register has collected more detailed data on the implants that have been used. Informa-

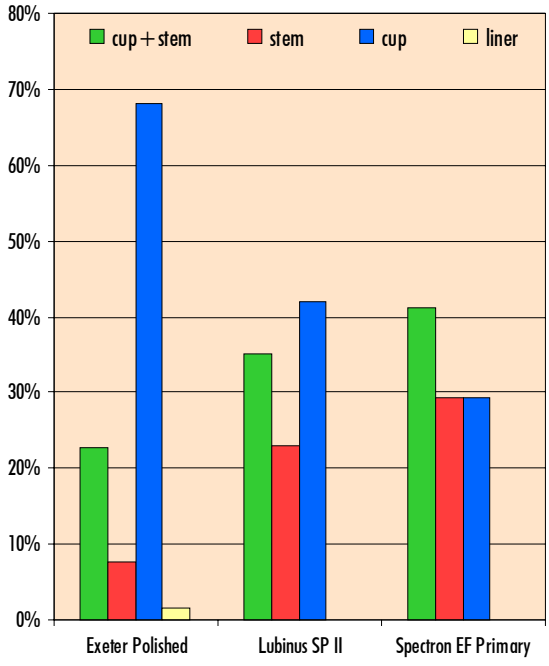
tion about implant size (thickness, length, neck angle) has been noted. In this year's report, we have used this information to investigate whether these design-related factors play any role in the risk of early revision as a result of loosening. To obtain sufficiently extensive material, only the three most frequently used stems have been studied (Lubinus SP II, Exeter polished, Spectron EF Primary). As article numbers have only been registered for the past seven years, the average follow-up period is short (Lubinus SP II = 3.0 ± 1.9 years, Exeter polished = 2.9 ± 1.9 years, Spectron EF Primary = 3.1 ± 1.9 years). The analysis has been based on revisions as a result of aseptic loosening of the stem or cup. As the diagram shows, exchanges or extractions of the cup in the Exeter group dominated, while exchange or extraction for the stem was more common in relative terms in the Lubinus and Spectron groups.

The early incidence of revision is low and extensive material is therefore required for analysis. During the period 1999-2005, Lubinus SP II (n = 38,360), Exeter polished (n = 19,436) and Spectron EF Primary (n = 6,525) were the cemented implants that were used most frequently. On an annual basis, about the same number of Exeter polished and Spectron EF Primary have been installed, while the Lubinus SP II has increased.

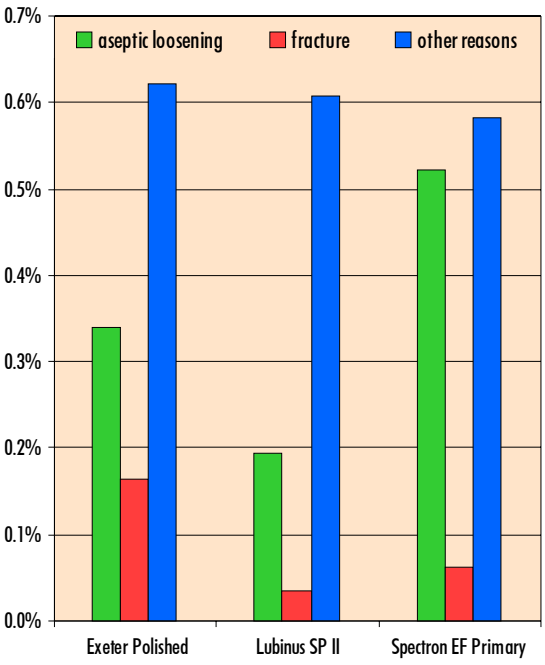
Prior to the analysis, the article numbers of both the stem and joint head were re-coded to create variables which describe parameters such as stem size (thickness), stem length, neck angle (Lubinus SP II), offset and neck length incorporated in the design of the joint head cone in a logical manner.

The selected implant types have some design-specific characteristics which had to be handled separately. Wherever possible, the analysis is based on standard sizes. This means that specially designed implants or implants that are used on a relatively small scale, such as dysplasia implants and stems longer than 150 mm, have been excluded. The Spectron stem has been analysed in terms of stem size (thickness), the incidence or not of extra offset and neck length. The Exeter implant has been analysed in terms of stem size (thickness), offset incorporated in the stem (37.5, 44 and 50) and neck length. The Lubinus SP II stem has been analysed in terms of stem size, CCD angle, the incidence of an extended neck and caput (femoral head) length. An offset parameter corresponding to a combination of offset incorporated in the stem and caput length was constructed for all three implant types. It should be pointed out that this variable does not take account of the way implant offset changes with the varying size class of the actual stem.

All three implant designs were analysed in separate regression models with adjustments for gender, age, diagnosis and incision. During the period 1999-2005, 0.2% (Lubinis SP II), 0.3% (Exeter polished) and 0.5% (Spectron EF Primary) of implants were revised as a result of aseptic loosening in these



The distribution of reason to reoperation for the 3 different stems is included in the analysis. Change/extraction of cup and/or stem was performed i all cases but one. The distribution within the groups differ ($p=0.003$, X^2-test), above all between the polished and the two matte/blasted stems concerning frequency of change of cup and stem.



The distribution of non-aseptic reoperations in relation to the total number of operated stems during the period 1999-2005 divided in aseptic loosening, fracture and other reasons. A small amount of stems that do not fulfill the criteria in the analysis (special design, length >150 mm, indistinct codes) have been excluded.

three groups. The distribution of revision causes in the individual groups (excluding infection) varied in such a way that, compared with the other two groups, aseptic loosening was relatively more common in the Spectron EF Primary group, while the Exeter implant was the subject of more revisions as a result of fracture than the other two. The total incidence of revision due to fracture excluding infection, based on all the implants installed in the individual groups, was 0.03% (Lubinis SP II), 0.06% (Spectron Primary) and 0.16% (Exeter polished), while the other causes were dominated by dislocation problems, which resulted in 0.5%-0.6% of the stems in the individual groups being revised during the period, regardless of design.

The analysis reveals that design factors have a significant impact on the risk of revision due to aseptic loosening. There are, however, interesting differences between the three stem types.

In the case of the Spectron implant, the risk is reduced by more than 50% for every increase in size. This variable has been determined with great reliability, with a confidence interval relatively far from 1 and a low p-value. There is also a 50% increase in the risk with every increase in total offset, calculated as the sum of the extra offset incorporated in the stem and neck length determined by the location of the joint head cone. In this case, the confidence interval is closer to 1 – in other words, this factor is less reliable. There is also a greater risk among men.

The polished Exeter prosthesis presents an entirely different picture. The risk of revision as a result of aseptic loosening is reduced as offset increases. It also declines with increasing age, but it increases if a posterior incision is used.

The risk profile for the Lubinus implant resembles that of the Spectron stem to some degree. The risk of revision due to aseptic loosening declines as the stem thickness increases and if an extra long stem neck is avoided. The combined offset factor, the length of the neck of the stem combined with the length of the neck of the joint head, does not produce a significant result. Other factors that increase the risk of revision due to aseptic loosening are male gender, operations using a lateral incision in the supine position (Hardinge incision) and operations due to necrosis of the femoral head.

An extended analysis based exclusively on stem revision as the outcome parameter is also of interest. However, we feel that the results are unreliable, owing to the relatively small number of revisions of this type and the short observation period. We are therefore planning to return to this topic in a later report.

After an average observation period of three years, we find that the design of the stem influences the risk of re-operation due to loosening. In every case but one, this means that the stem and/or cup were replaced or extracted. Men are particularly vulnerable when a matt or blasted implant of small size is used and, in these groups, the risk increases as offset is increased. The polished Exeter implant, on the other hand, appears to be more sensitive to a small offset angle. This finding is difficult to interpret, but it could perhaps be related to the fact that cup problems are more common in this group.

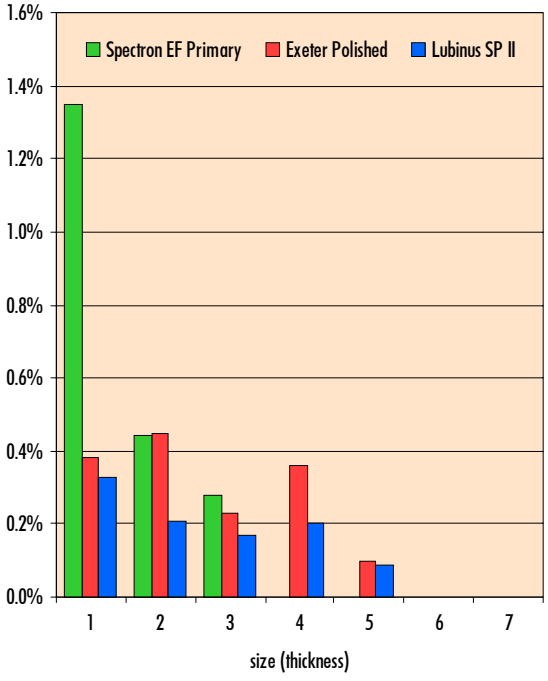
	Relative risk [Exp(B)]	**95% confidence interval**		***p-value***
		lower	upper	
Spectron EF Primary *(n=6,489)*				
Stem size	**0.36**	0.21	0.61	*0.0002*
Total offset*	**1.47**	1.08	2.00	*0.013*
Male gender	**2.35**	1.10	5.01	*0.027*
Exeter polished *(n=18,869)*				
Stem offset	**0.49**	0.30	0.80	*0.004*
Age	**0.95**	0.93	0.97	*0.000003*
Posterior incision	**2.77**	1.45	5.26	*0.002*
Lubinus SP II *(n=37,426)*				
Stem thickness	**0.66**	0.52	0.84	*0.0006*
Extra neck length	**2.63**	1.14	6.25	*0.02*
Male gender	**2.64**	1.60	4.35	*0.0001*
Diagnosis (idop. femoral head necrosis)	**4.54**	1.96	11.11	*0.0004*
Anterior incision, patient on back	**2.63**	1.04	6.67	*0.04*

**The sum of neck length and stem offset (standard/extra offset).*
Outcome of Cox regression analysis for the three different typs of cemented stems have been studied. The number of observations have been reduced as some odd stems have been excluded and due to inadequate codes. For the sake of clarity, design related variables has been placed first (bold-italics text).

In view of the fact that the number of actual revisions due to aseptic loosening is low, it should be pointed out that factors that prove to be of low significance should be evaluated with caution and should not be directly applied in clinical practice. Any assessment of the impact of the offset factor should be based on the fact that we do not know the extent to which the registered offset means that the normal anatomy was or was not restored. The analysis also indicates that the smallest sizes of the Spectron and Lubinus implants represent an increased risk of re-operation due to early loosening. With this analysis as the starting point, it is not possible to determine whether this is solely due to the implant that is chosen or whether patients with a narrow primary marrow space and/or narrow femur automatically run a greater risk of stem loosening. The findings do, however, speak in favour of using alternative implants, such as uncemented prostheses or cemented polished stems, but as yet we have no reliable data to confirm this.

Patients undergoing early re-operations constitute a high-risk group

The scientific support for surgical treatment strategies in hip revision surgery is limited. This is probably due to the fact that most observations are based on results from highly specialised clinics. We have therefore examined the national results following hip revision surgery in order systematically to study the risk factors for new revisions (re-revisions).



Distribution of stem sizes being revised due to aseptic loosening within each group respectively. The smallest stem size has been coded as 1 independent of the manufacturer's term.

We analysed the production of initial revisions (n = 13,424) between 1 January 1979 and 31 December 2000 in the Hip Arthroplasty Register. Revision was defined as the exchange of a cup and/or stem. Stems that were re-cemented in the same cement shell and exchanges of implant heads and/or liners were excluded. The cases that were treated using resection arthroplasty and which were not given a new implant during the period in question were also excluded.

A new revision involves installing or replacing a cup and/or stem. The database was also matched with the Swedish register of deaths in order to be able to combine the definition of failure with the fact that the patient had died in the analysis. It is not possible to exclude the possibility that revision patients have a higher mortality rate compared with the normal population and it is also important to take account of the fact that the deceased person's implant may have been loose.

Almost 60% of all revisions were performed at central hospitals and in almost 50% of cases all the implant components were replaced.

The majority of cup revisions were performed using cement containing antibiotics, but an increase in the number of uncemented cup revisions can be seen. One third of cemented cup revisions and almost 60% of all uncemented cup revisions are performed using some kind of bone transplantation, normally allografts. In the majority of cup revisions, re-cementing was performed without any type of transplantation. Between 1990 and 2000, however, the number of bone-packed cups regardless of fixation type increased to 17%.

When it comes to stem revisions, a clearer increase can be seen in uncemented fixation, normally in the form of distally anchored prostheses. In about a quarter of the stem revisions, some form of allograft was used (primarily bone-bank bone) and, since 1990, using the bone-packing technique on an increasing scale. At the end of the observation period, the frequency of bone packing was around 15%. The majority (around 80%) were, however, performed using conventional re-cementing.

Re-revisions were performed on 1,750 (13%) of hips. The percentage of young patients (40-60 years of age) in this group almost doubled compared with initial revisions. As expected, the frequency of deep infections, dislocations and resection interventions was far higher.

The most important finding was that early revisions (≤ 5-7 years after the primary operation) ran a considerable over-risk of being revised and the effect was most pronounced among younger men who had undergone revisions due to aseptic stem loosening. A reduction in risk (8% a year) could be found as the survival of the primary implant increased and also as the age of the patient rose. We found that the high risk remained even after the first revision. It was therefore impossible to reduce the risk of a second revision, which is disappointing. Aseptic loosening and osteolysis were the most common indications for new revisions.

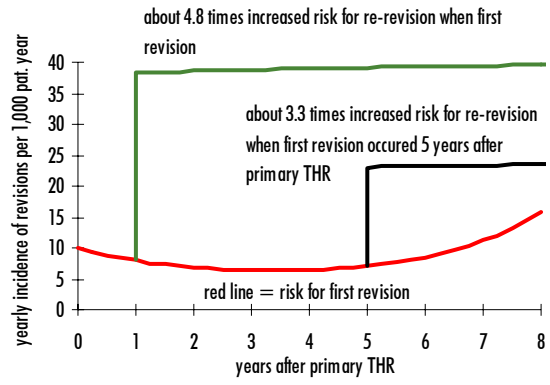
Generally speaking, the prognosis for revisions was somewhat better if the revisions were performed at a university or regional hospital rather than a central or rural hospital. In the same way, revisions that were performed at a central hospital ran a smaller risk of re-revision compared with those performed at rural hospitals. Cemented revisions (both cup and stem) also ran a higher risk of revision in relation to uncemented ones.

The general 10-year survival after the initial revision in Sweden was 88% for cups and around 78% for stems. The uncemented cups tended to run a smaller risk of re-revision than the cemented ones and, in the latter group, a smaller risk was found for the Charnley cup compared with the Exeter cup. When it came to stem revisions, the 10-year survival of the uncemented Wagner SL and the cemented Lubinus SP II was similar and they were both also statistically slightly better than both the Charnley and Exeter stems.

Bone packing did not result in any dramatic reduction in risk when it came to either the cemented or uncemented technique in relation to conventional re-cementing and uncemented prostheses without allografts in conjunction with stem or cup revisions.

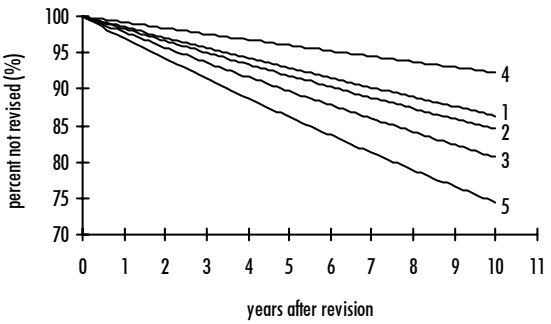
This study reveals that the result after primary hip arthroplasty follows the patient. Early aseptic loosening involves not only the risks that are associated with the actual revision but also an increased risk of needing to undergo one or more additional and probably fairly difficult revisions as a result of aseptic loosening/osteolysis. To some degree, early revision after a primary implant can be related to patient-associated factors. In the majority of cases, however, technique-related factors play a decisive part, which means that this is something that is easier to influence. Interest must focus on top-quality primary arthroplasty when it comes to the choice of implant design and surgical technique. This information is important, as the revision of early implant failure cannot be regarded as a reliable solution for the patient. The advances we have seen in revision surgery in the past 10 years cannot therefore be regarded as justification for offering a young, active patient with a degenerative hip disease, for example, modern techniques that have not been studied in sufficient detail for primary hip arthroplasty. Quite the reverse; it appears that the quality of revisions among patients with early implant loosening must be improved.

The suggestion that the treatment of patients with deep infections or advanced bone loss should be centralised is not controversial. The current results add yet another risk group, early initial revisions. Some of these patients, particularly those in the younger age groups, should probably be offered the opportunity for a re-operation at more highly specialised centres.

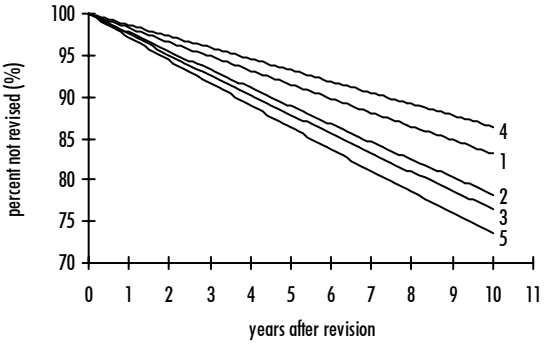


Risk for first revision and re-revision for a 65-year old male patient with osteoarthritis operated upon with primary THR. The patient runs a 7% risk to be revised within 8 years after primary THR. If the patient is revised within 1 year the risk increases for re-revision to 28% (green line). If the re-revision occurs 5 years after the primary THR the risk for re-revision is still enhanced, but considerably lower than if a revision already at 1 year (black line). Data are calculated for a mean value of the different types of hospitals.

First-time revision of the cup



First-time revision of the stem



Curve	Hospital	Fixation	Year between primary THR and first revision
1	university/regional	uncemented	2
2	university/regional	cemented	2
3	rural	uncemented	2
4	university/regional	uncemented	8
5	rural	cemented	0.25

Survival of cup (upper diagram) and stem (lower diagram) in relation to hospital type, fixation and time to first revision of the primary implant. Poisson regression.

Number of Revisions per Reason and Years of Revisions

only the first revision, primary THRs 1979-2005

Reason for revision	1979-2000	2001	2002	2003	2004	2005	Total	Share
Aseptic loosening	10,921	882	947	900	761	784	15,195	74.9%
Dislocation	835	107	123	126	166	127	1,484	7.3%
Deep infection	1,086	54	74	87	73	79	1,453	7.2%
Fracture	730	79	75	95	92	90	1,161	5.7%
Technical error	427	7	10	13	42	26	525	2.6%
Implant fracture	220	24	12	21	16	13	306	1.5%
Miscellaneous	60	10	11	6	13	9	109	0.5%
Pain only	47	2	5	4	5	3	66	0.3%
Total	14,326	1,165	1,257	1,252	1,168	1,131	20,299	100%

Number of Revisions per Reason and Number of Previous Revisions

primary THRs 1979-2005

Reason for revision	0		1		2		> 2		Total	Share
Aseptic loosening	15,195	74.9%	2,109	62,7%	363	56.9%	74	42.8%	17,741	72.5%
Dislocation	1,484	7.3%	434	12,9%	100	15.7%	45	26.0%	2,063	8.4%
Deep infection	1,453	7.2%	365	10,8%	87	13.6%	32	18.5%	1,937	7.9%
Fracture	1,161	5.7%	267	7,9%	51	8.0%	6	3.5%	1,485	6.1%
Technical error	525	2.6%	85	2,5%	18	2.8%	2	1.2%	630	2.6%
Implant fracture	306	1.5%	61	1,8%	10	1.6%	6	3.5%	383	1.6%
Miscellaneous	109	0.5%	31	0,9%	6	0.9%	6	3.5%	152	0.6%
Pain only	66	0.3%	13	0,4%	3	0.5%	2	1.2%	84	0.3%
Secondary infection	0	0.0%	1	0,0%	0	0.0%	0	0.0%	1	0.0%
Total	20,299	100%	3,366	100%	638	100%	173	100%	24,476	100%

Number of Revisions per Diagnosis and Number of Previous Revisions

primary THRs 1979-2005

Diagnosis at primary THR	0		1		2		> 2		Total	Share
Primary osteoarthritis	14,981	73.8%	2,370	70.4%	432	67.7%	112	64.7%	17,895	73.1%
Fracture	1,899	9.4%	287	8.5%	44	6.9%	6	3.5%	2,236	9.1%
Inflammatory arthritis	1,631	8.0%	334	9.9%	76	11.9%	22	12.7%	2,063	8.4%
Childhood disease	996	4.9%	233	6.9%	50	7.8%	20	11.6%	1,299	5.3%
Idiopathic femoral head necrosis	359	1.8%	57	1.7%	14	2.2%	4	2.3%	434	1.8%
Secondary arthritis after trauma	166	0.8%	49	1.5%	13	2.0%	9	5.2%	237	1.0%
Secondary osteoarthritis	62	0.3%	7	0.2%	1	0.2%	0	0.0%	70	0.3%
Tumor	32	0.2%	7	0.2%	4	0.6%	0	0.0%	43	0.2%
(missing)	173	0.9%	22	0.7%	4	0.6%	0	0.0%	199	0.8%
Total	20,299	100%	3,366	100%	638	100%	173	100%	24,476	100%

Number of Revisions per Year of Revision and Number of Previous Revisions

primary THRs 1979-2005

Year of revision	0		1		2		> 2		Total	Share
1979-2000	14,326	70.6%	2,131	63.3%	356	55.8%	69	39.9%	16,882	69.0%
2001	1,165	5.7%	252	7.5%	57	8.9%	23	13.3%	1,497	6.1%
2002	1,257	6.2%	236	7.0%	60	9.4%	20	11.6%	1,573	6.4%
2003	1,252	6.2%	259	7.7%	57	8.9%	20	11.6%	1,588	6.5%
2004	1,168	5.8%	261	7.8%	51	8.0%	18	10.4%	1,498	6.1%
2005	1,131	5.6%	227	6.7%	57	8.9%	23	13.3%	1,438	5.9%
Total	20,299	100%	3,366	100%	638	100%	173	100%	24,476	100%

Number of Revisions per Type of Fixation at Primary THRs and Year of Revision

only the first revision, primary THRs 1979-2005

Type of fixation at primary THR	1979-2000	2001	2002	2003	2004	2005	Total	Share
Cemented	12,276	934	985	959	923	890	16,967	83.6%
Uncemented	1,138	126	136	143	105	86	1,734	8.5%
Hybrid	399	79	103	124	111	122	938	4.6%
Reversed Hybrid	71	5	8	10	18	17	129	0.6%
(missing)	442	21	25	16	11	16	531	2.6%
Total	14,326	1,165	1,257	1,252	1,168	1,131	20,299	100%

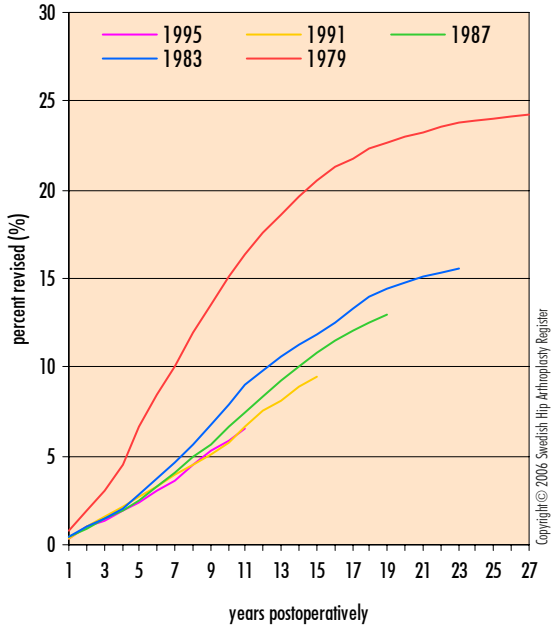
Number of Revisions per Reason and Time to Revision

only the first revision, primary THRs 1979-2005

Reason for revision	0 – 3 years		4 – 6 years		7 – 10 years		> 10 years		Total	Share
Aseptic loosening	2,638	47.0%	3,376	83.4%	4,553	86.4%	4,628	86.1%	15,195	74.9%
Dislocation	1,016	18.1%	157	3.9%	148	2.8%	163	3.0%	1,484	7.3%
Deep infection	1,075	19.2%	185	4.6%	123	2.3%	70	1.3%	1,453	7.2%
Fracture	295	5.3%	208	5.1%	293	5.6%	365	6.8%	1,161	5.7%
Technical error	423	7.5%	35	0.9%	35	0.7%	32	0.6%	525	2.6%
Implant fracture	48	0.9%	60	1.5%	100	1.9%	98	1.8%	306	1.5%
Miscellaneous	65	1.2%	17	0.4%	12	0.2%	15	0.3%	109	0.5%
Pain only	50	0.9%	8	0.2%	3	0.1%	5	0.1%	66	0.3%
Total	5,610	100%	4,046	100%	5,267	100%	5,376	100%	20,299	100%

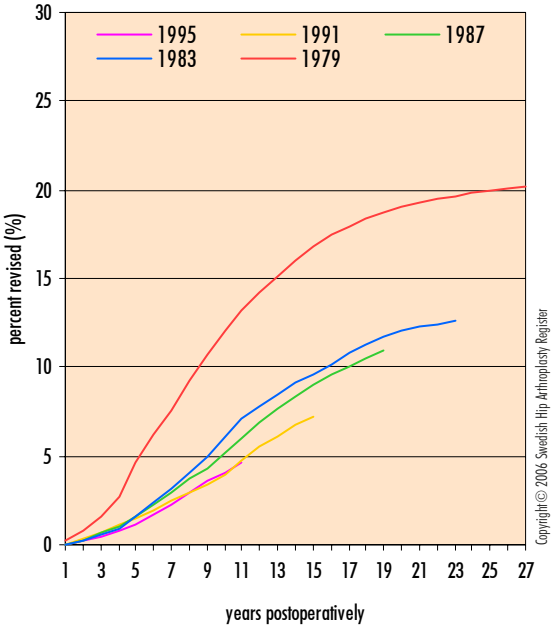
All Diagnoses and All Reasons

cumulative frequency of revision



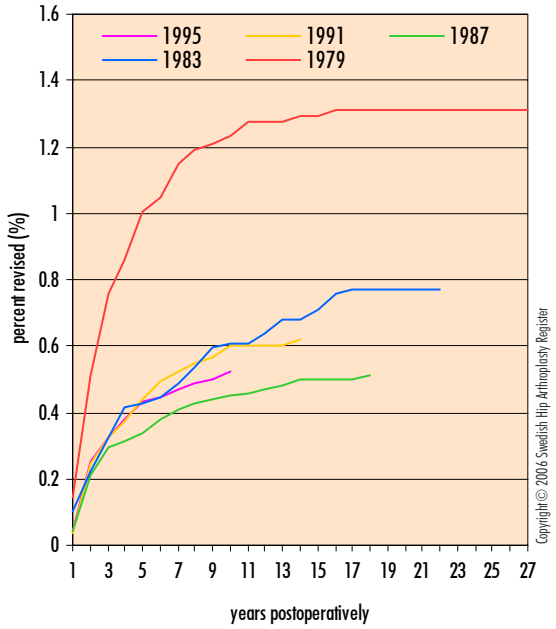
Aseptic Loosening

cumulative frequency of revision



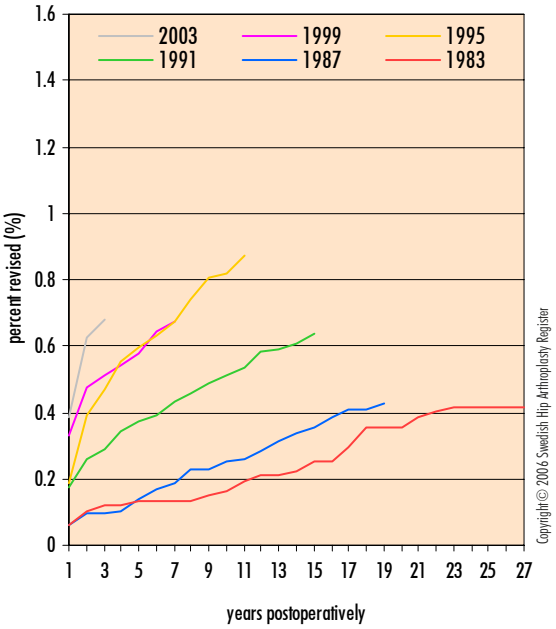
Deep Infection

cumulative frequency of revision



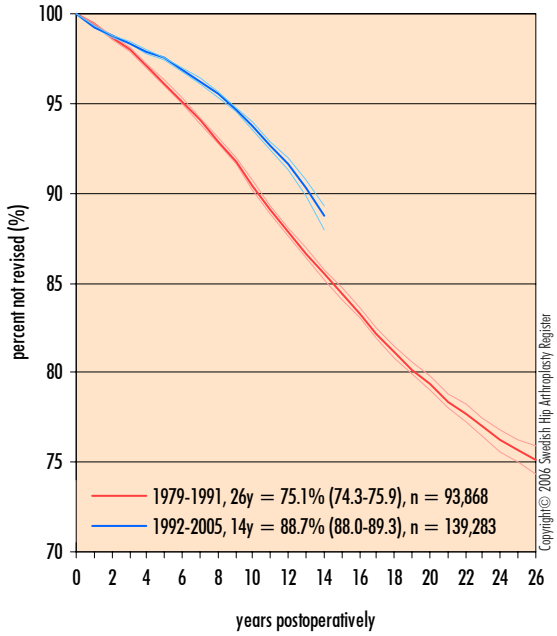
Dislocation

cumulative frequency of revision



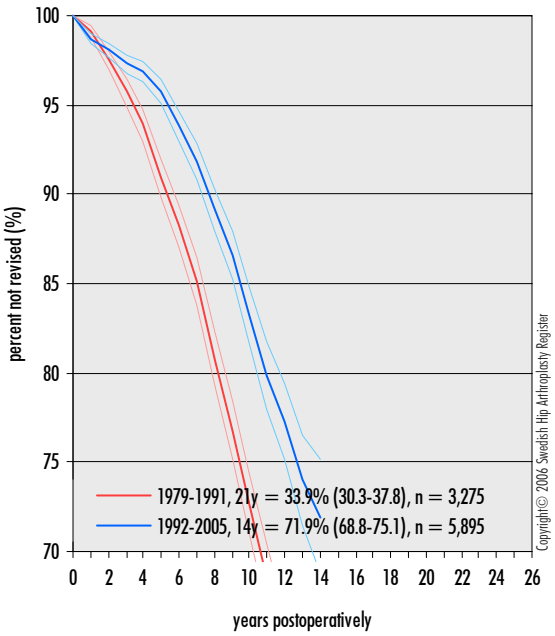
All Cemented Implants

all diagnoses and all reasons for revision



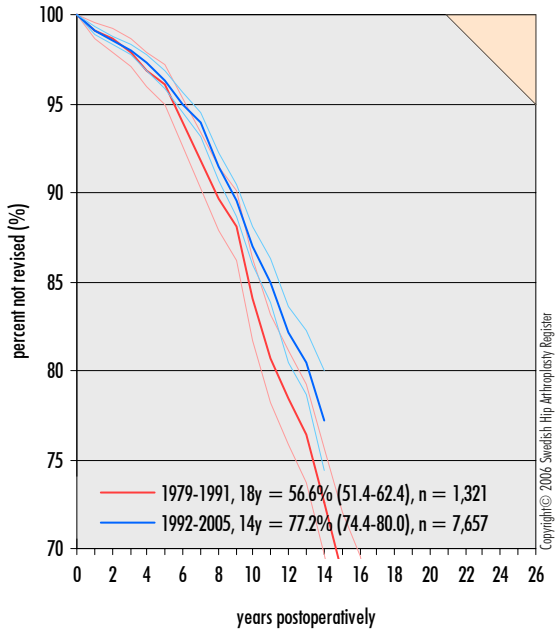
All Uncemented Implants

all diagnoses and all reasons for revision



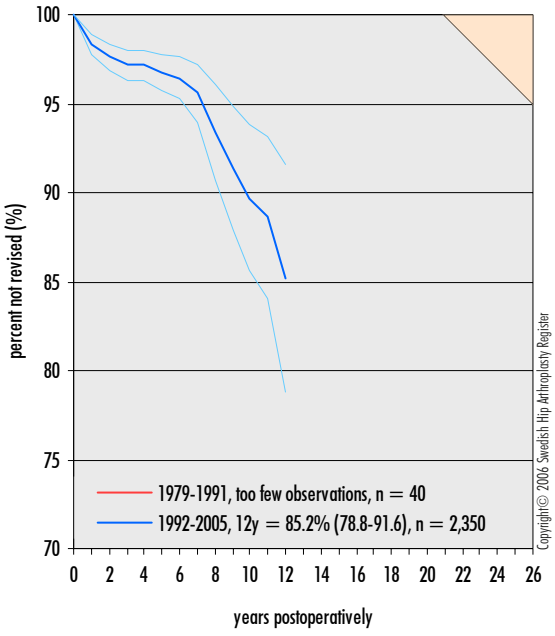
All Hybrid Implants

all diagnoses and all reasons for revision



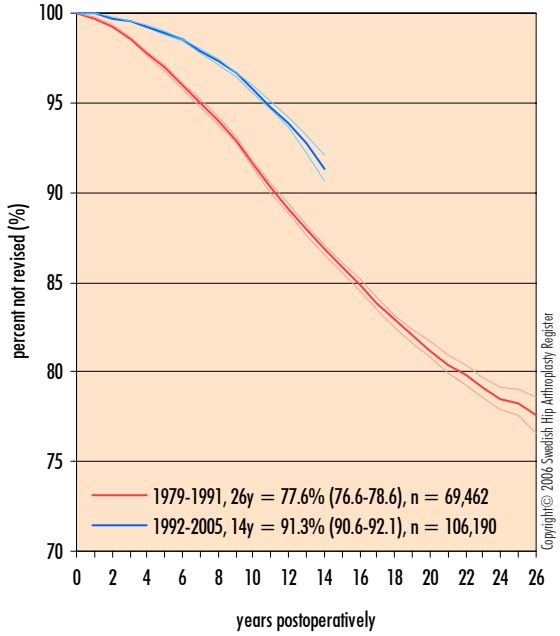
All Reversed Hybrid Implants

all diagnoses and all reasons for revision



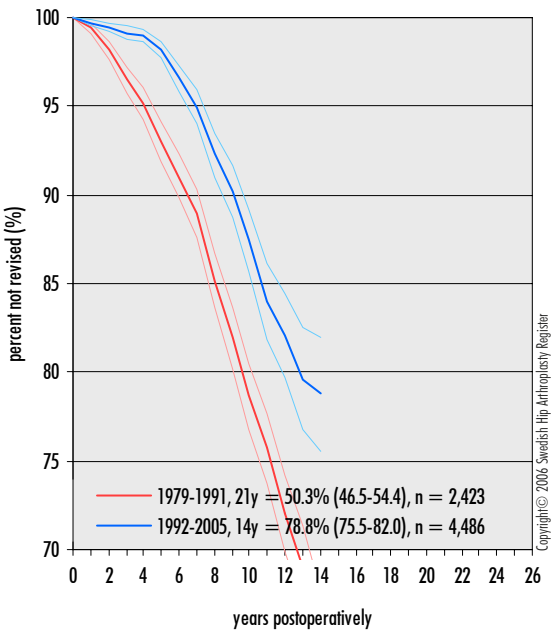
All Cemented Implants

osteoarthritis and aseptic loosening



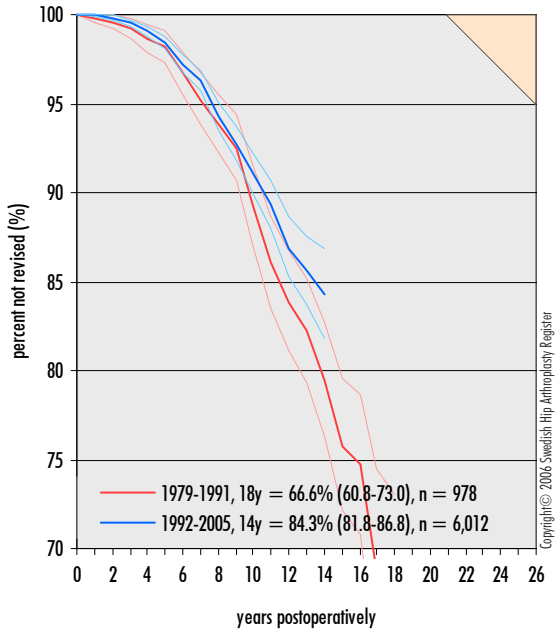
All Uncemented Implants

osteoarthritis and aseptic loosening



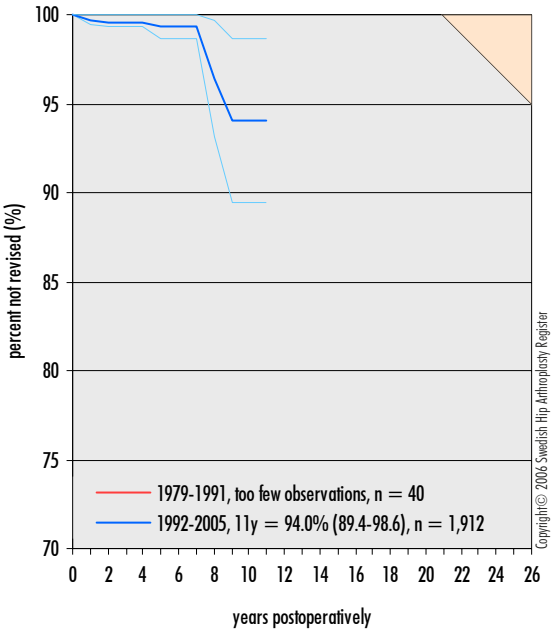
All Hybrid Implants

osteoarthritis and aseptic loosening



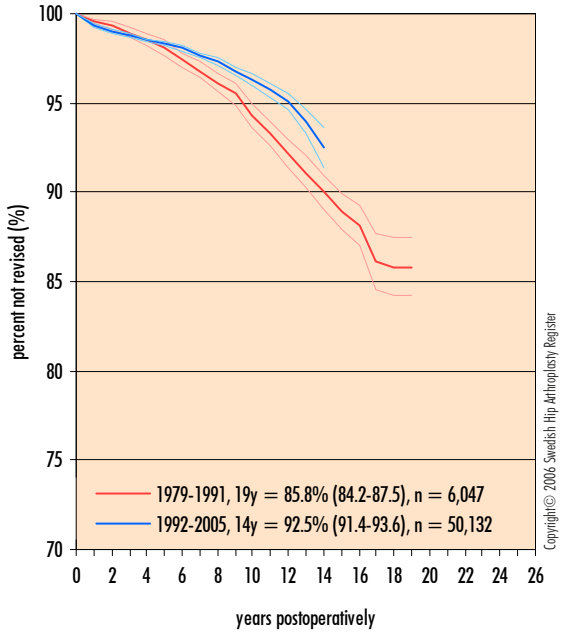
All Reversed Hybrid Implants

osteoarthritis and aseptic loosening



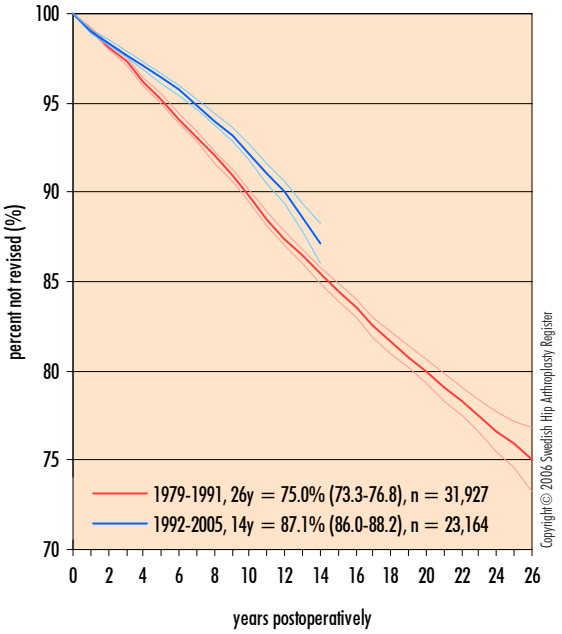
Lubinus SP II

all diagnoses and all reasons for revision



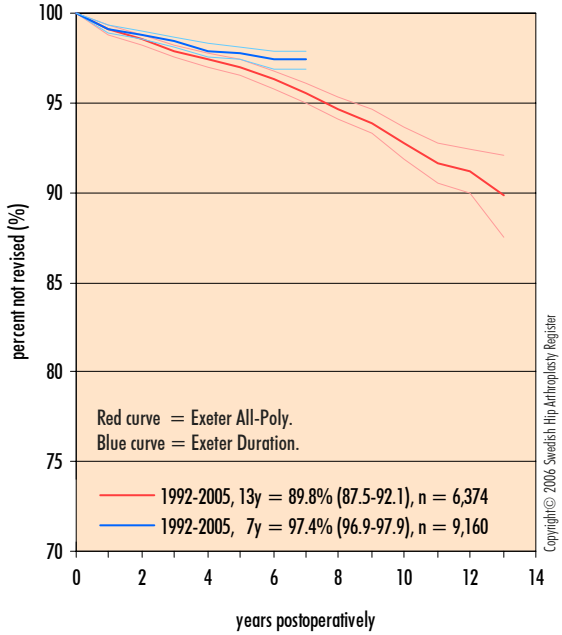
Charnley

all diagnoses and all reasons for revision



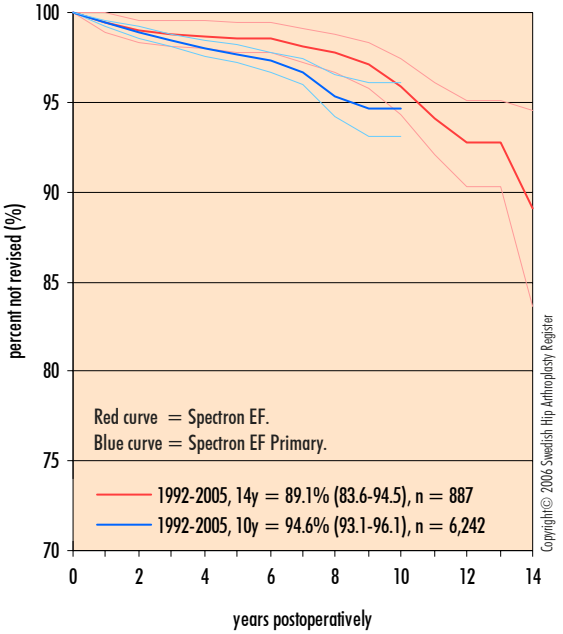
Exeter (Exeter Polished)

all diagnoses and all reasons for revision



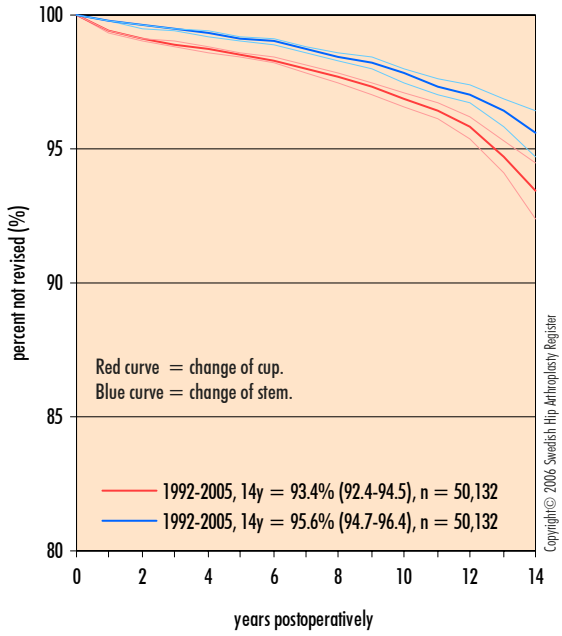
Reflection All-Poly (Spectron)

all diagnoses and all reasons for revision



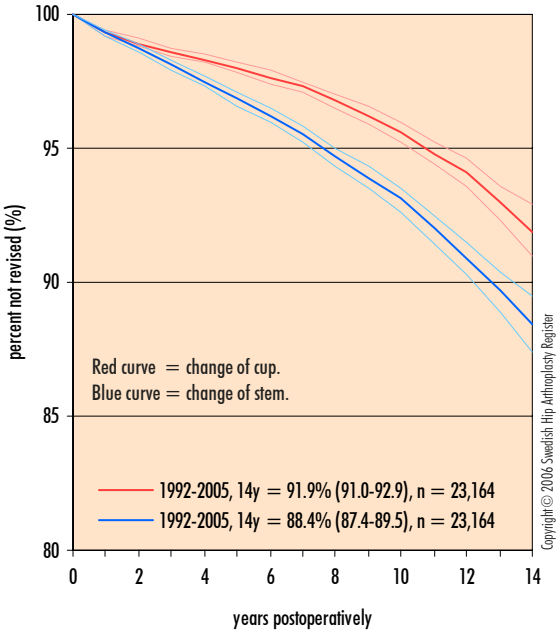
Lubinus SP II

all diagnoses and all reasons for revision



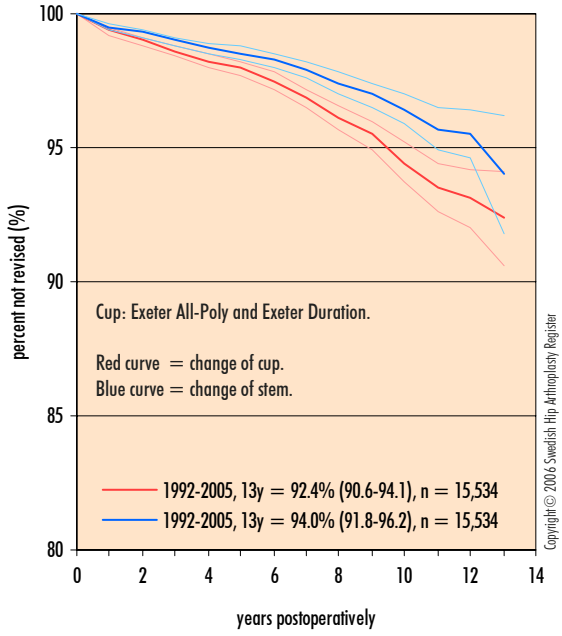
Charnley

all diagnoses and all reasons for revision



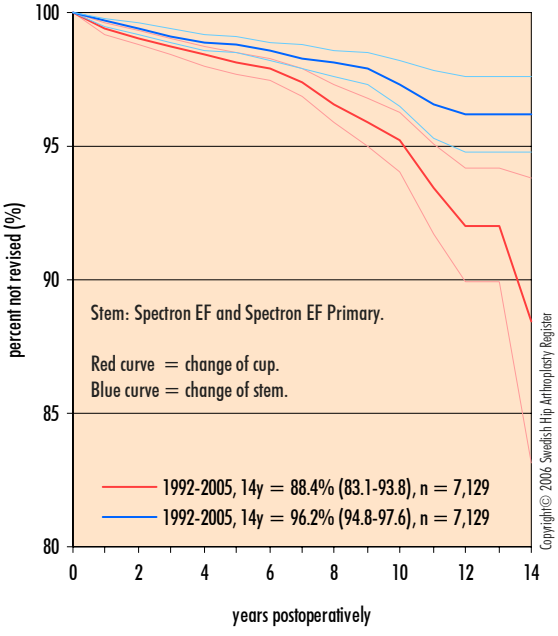
Exeter (Exeter Polished)

all diagnoses and all reasons for revision



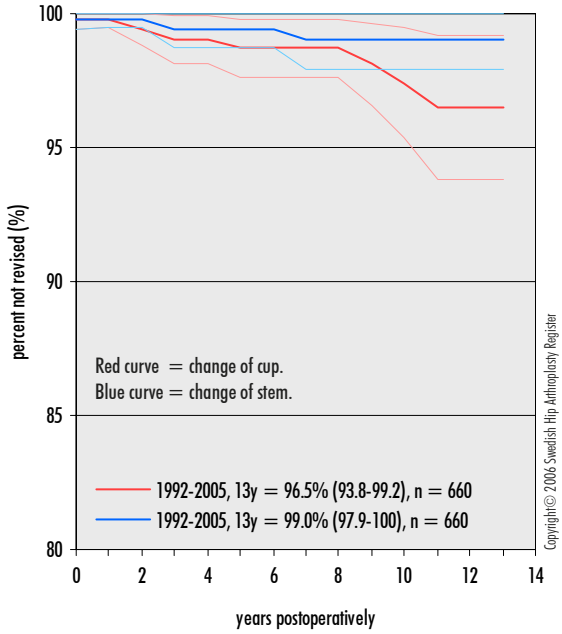
Reflection All-Poly (Spectron)

all diagnoses and all reasons for revision



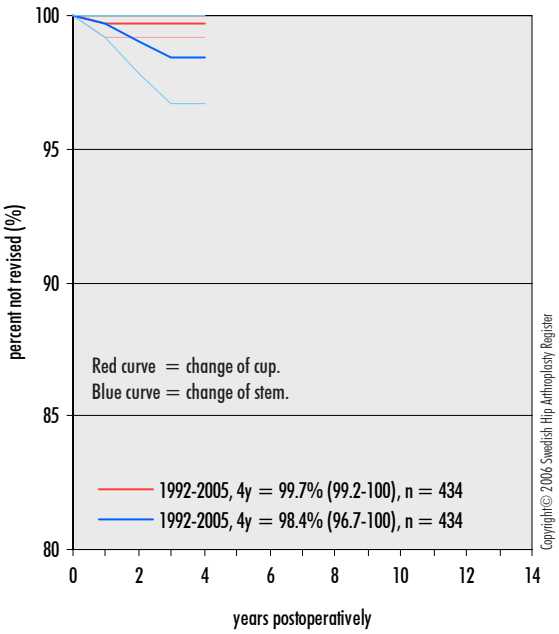
CLS Spotorno

all diagnoses and all reasons for revision



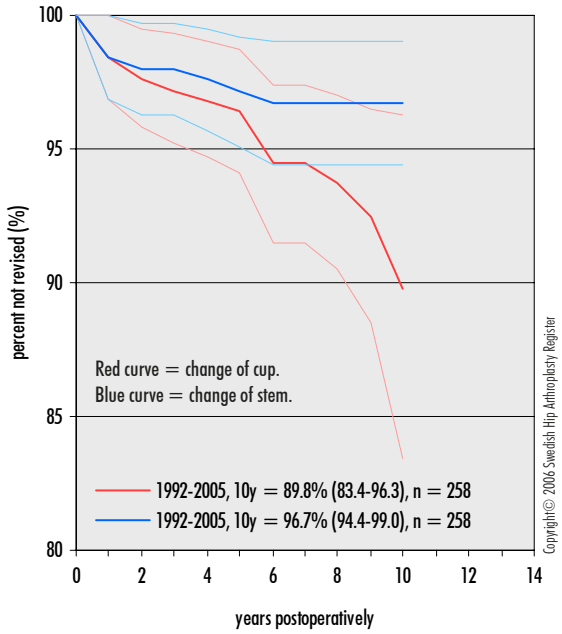
Allofit (CLS Spotorno)

all diagnoses and all reasons for revision



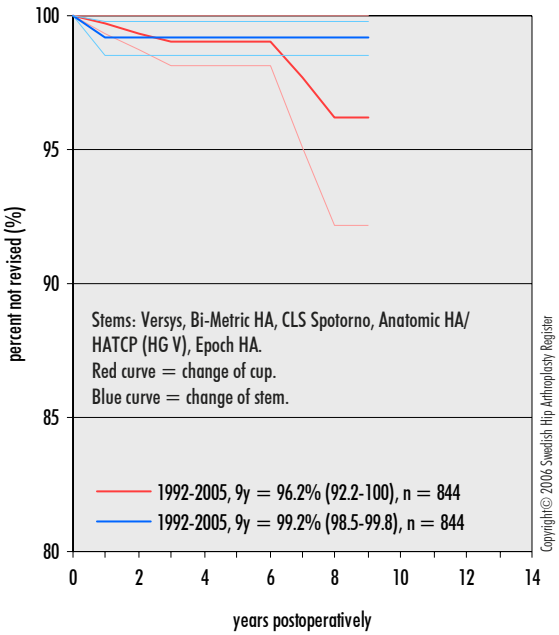
Romanus HA (Bi-Metric HA uncem.)

all diagnoses and all reasons for revision



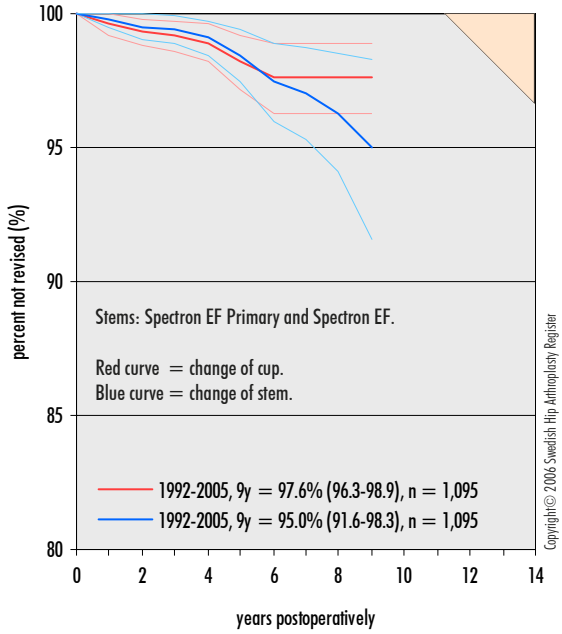
Trilogy HA

all diagnoses and all reasons for revision



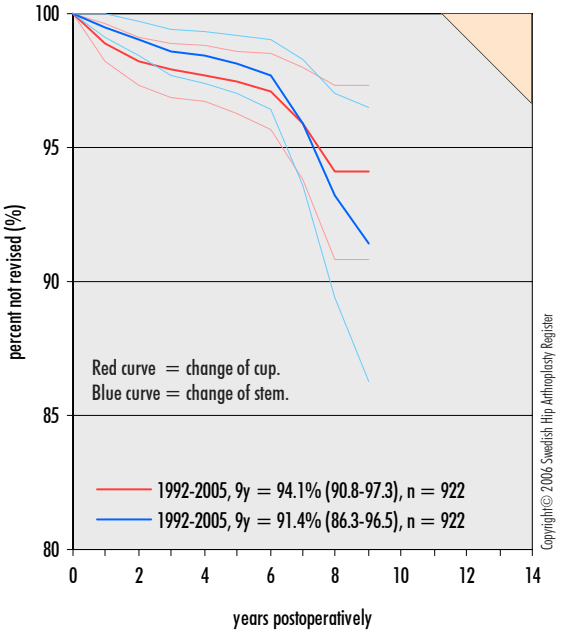
Trilogy HA (Spectron)

all diagnoses and all reasons for revision



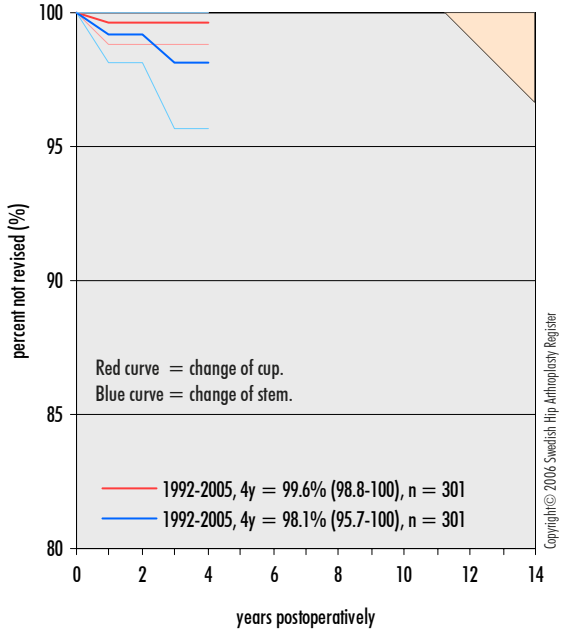
Trilogy HA (Lubinus SP II)

all diagnoses and all reasons for revision



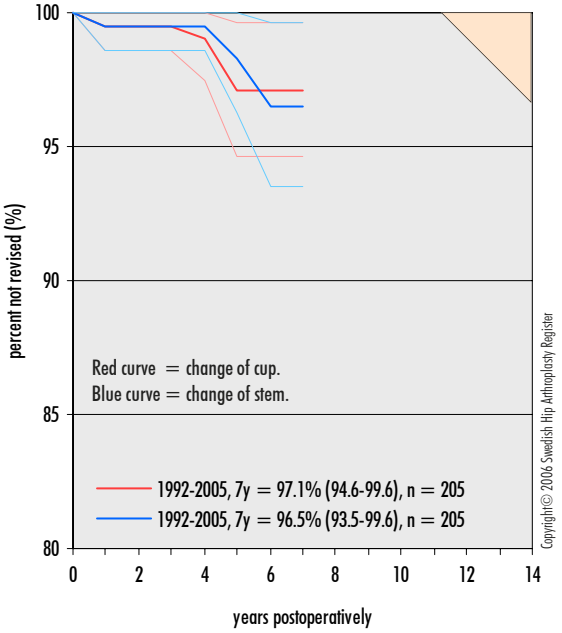
BHR

all diagnoses and all reasons for revision

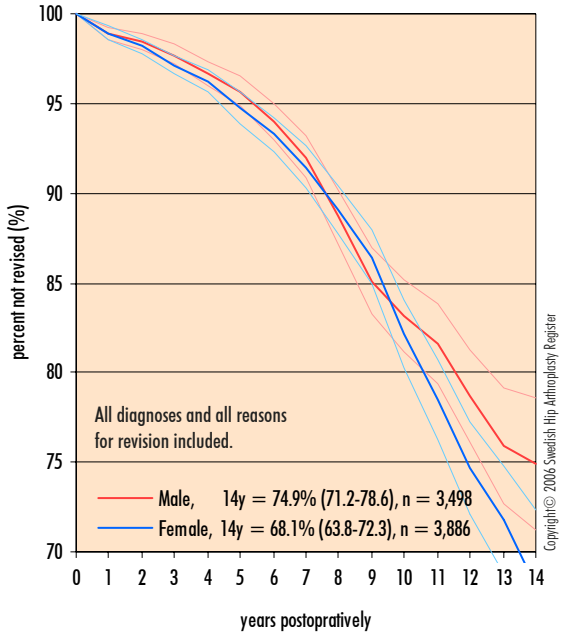


ABG II HA (Lubinus SP II)

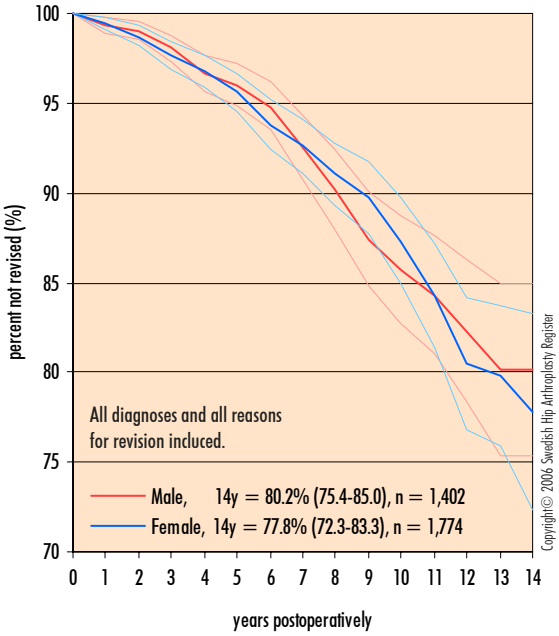
all diagnoses and all reasons for revision



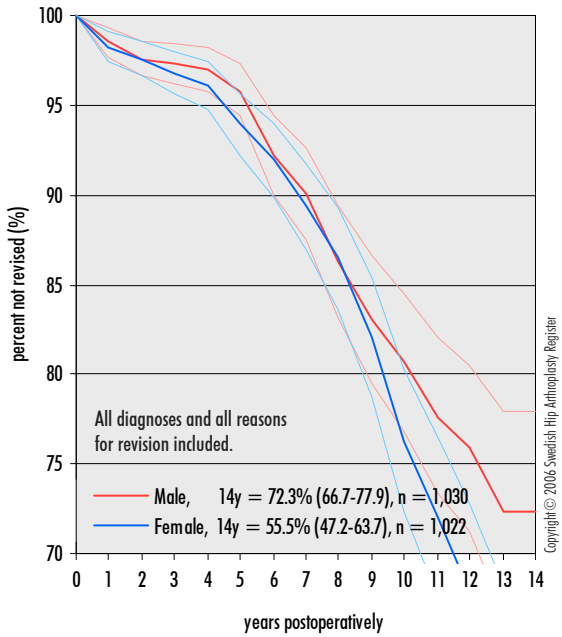
Younger than 50 years
all observations, 1992-2005



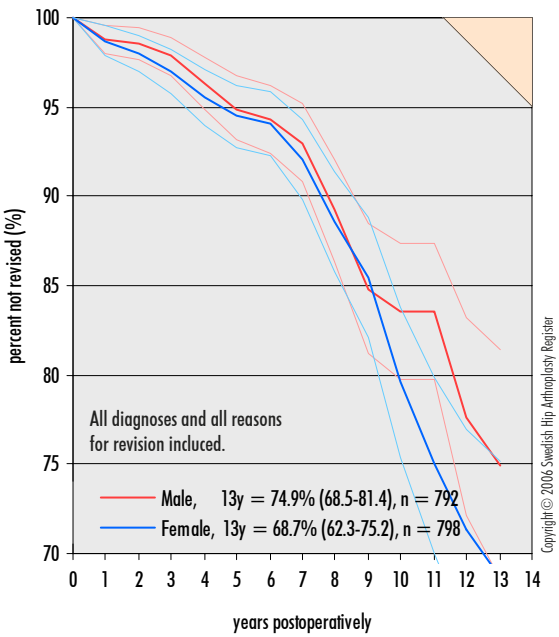
Younger than 50 years
cemented implants, 1992-2005



Younger than 50 years
uncemented implants, 1992-2005

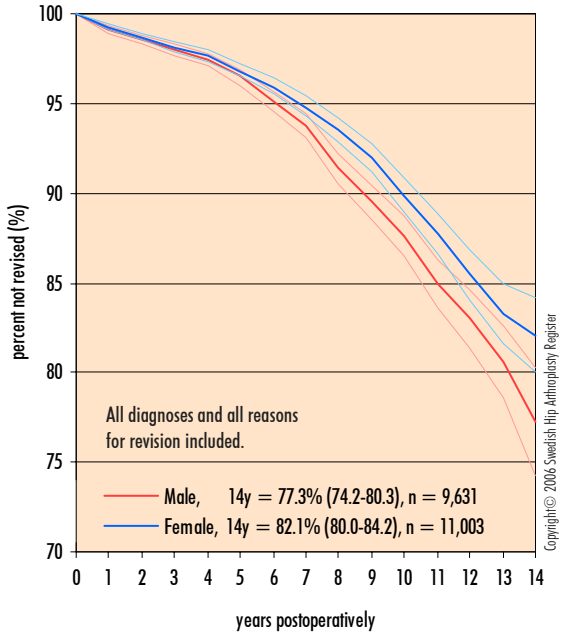


Younger than 50 years
hybrid implants, 1992-2005



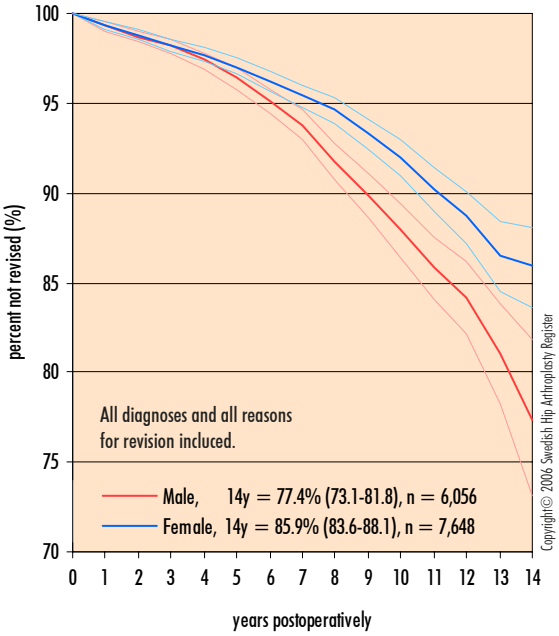
Between 50 and 59 years

all observations, 1992-2005



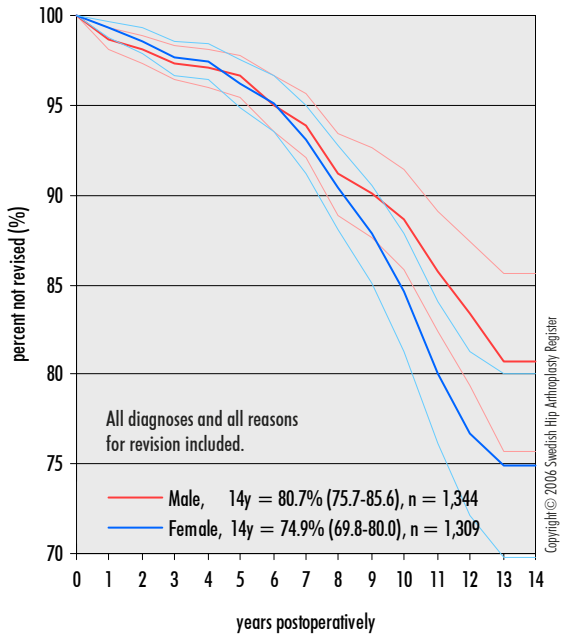
Between 50 and 59 years

cemented implants, 1992-2005



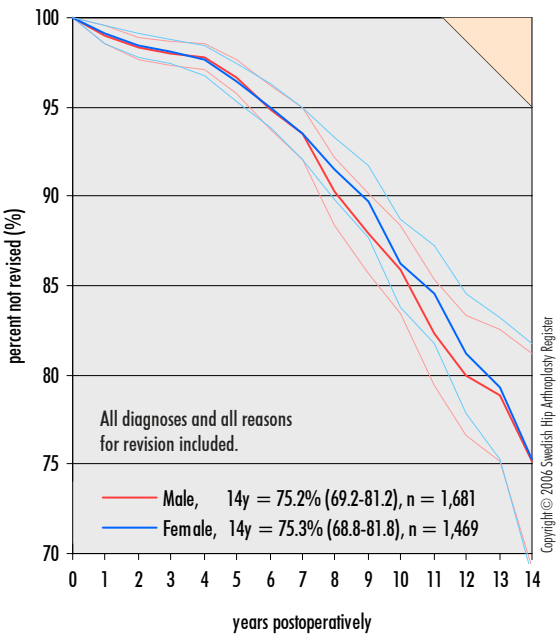
Between 50 and 59 years

uncemented implants, 1992-2005



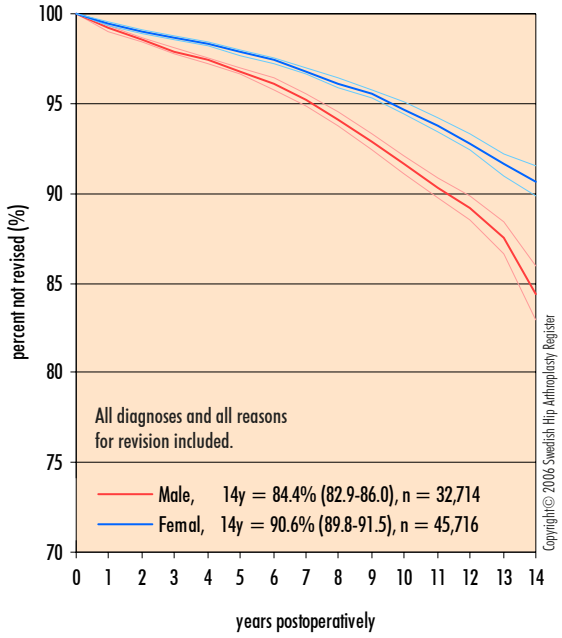
Between 50 and 59 years

hybrid implants, 1992-2005



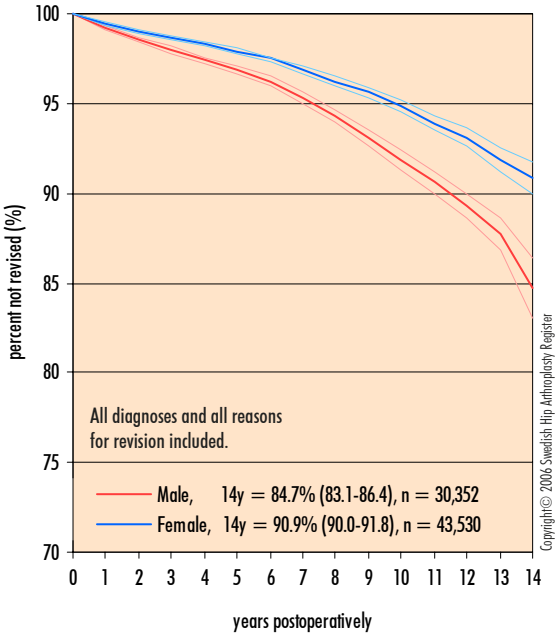
Between 60 and 75 years

all observations, 1992-2005



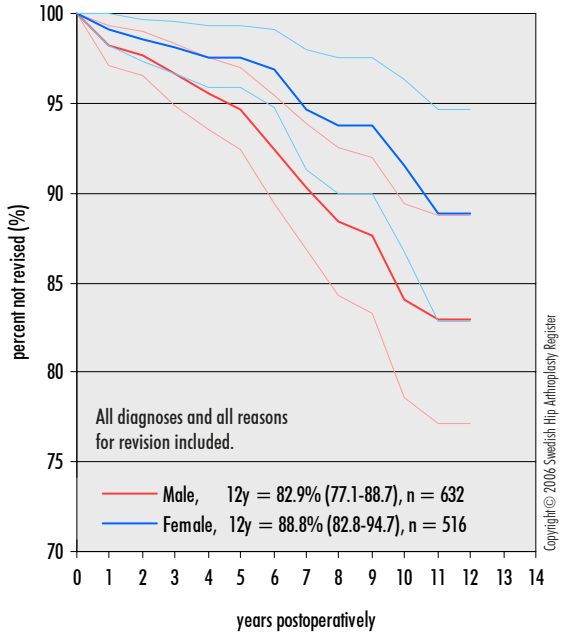
Between 60 and 75 years

cemented implants, 1992-2005



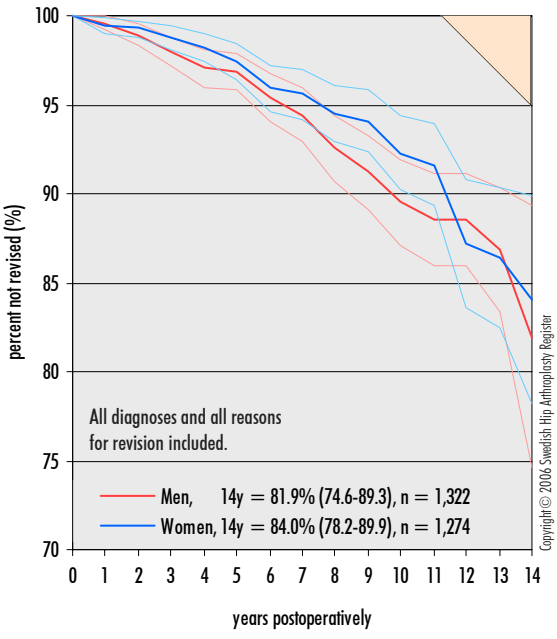
Between 60 and 75 years

uncemented implants, 1992-2005

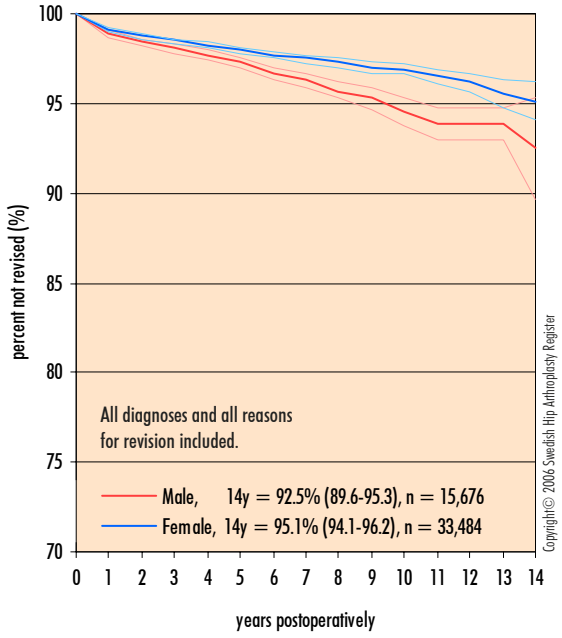


Between 60 and 75 years

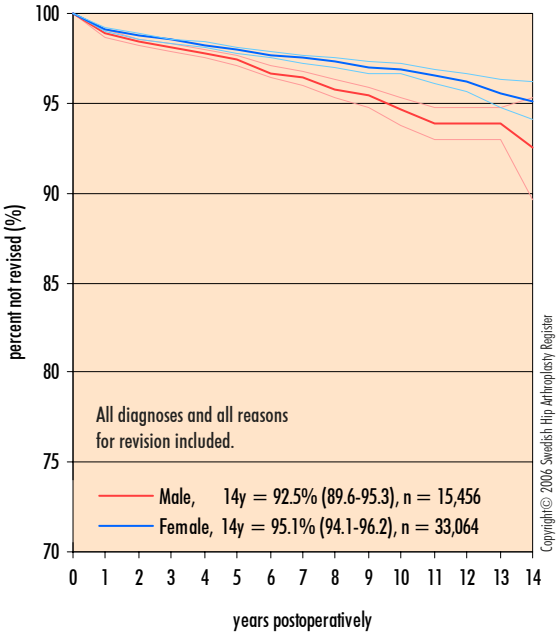
hybrid implants, 1992-2005



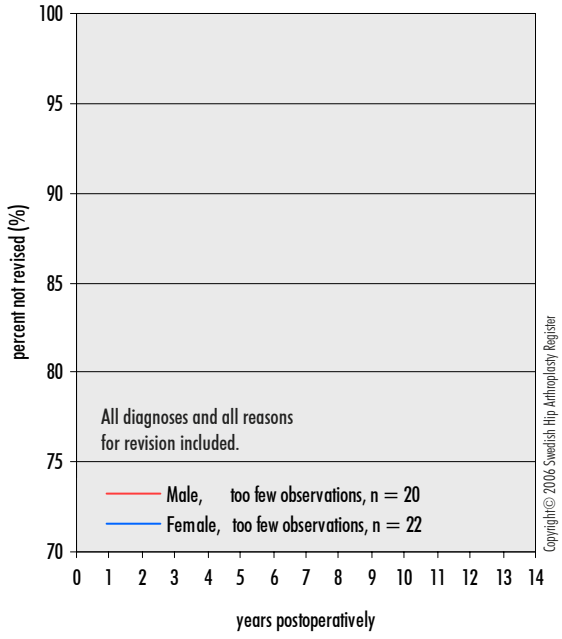
Older than 75 years
all observations, 1992-2005



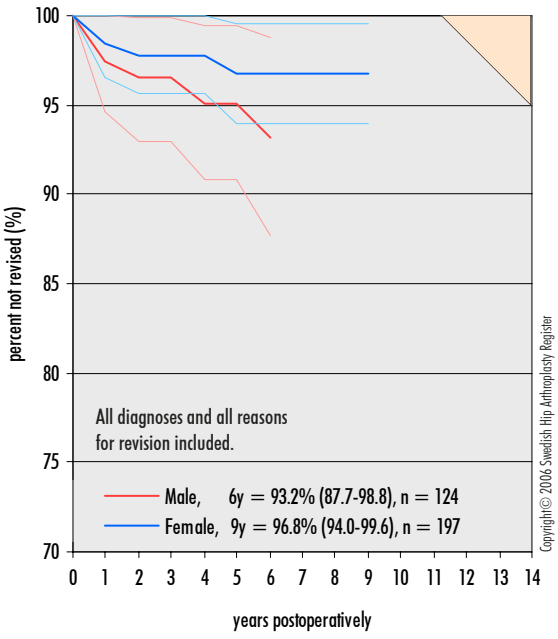
Older than 75 years
cemented implants, 1992-2005



Older than 75 years
uncemented implants, 1992-2005



Older than 75 years
hybrid implants, 1992-2005



Implant Survival per Type

all diagnoses and all reasons for revision, 1992-2005

Cup (Stem)	Period [1]	Number [2]	OA [3]	60-75 yrs [4]	5 yrs	95% CI	10 yrs	95% CI
ABG HA (ABG cem.)	1992–1998	241	58.9%	27.0%	98.2%	±1.8%	92.7%	±4.1%
ABG HA (ABG uncem.)	1992–1998	281	79.4%	5.3%	97.1%	±1.9%	82.5%	±4.7%
ABG HA (Lubinus SP II)	1992–1998	335	80.6%	39.4%	96.9%	±1.9%	86.2%	±4.3%
ABG II HA (ABG uncem.)	1993–2005	195	80.5%	7.7%	97.7%	±2.3%		
ABG II HA (Exeter Polished)	1997–2005	67	82.1%	14.9%	96.8%	±3.8%		
ABG II HA (Lubinus SP II)	1997–2004	205	81.5%	30.7%	97.1%	±2.5%		
Biomet Müller (Bi-Metric cem.)	1992–1996	1,098	66.6%	57.5%	96.2%	±1.2%	90.5%	±2.0%
Biomet Müller (Bi-Metric HA uncem.)	1995–2005	188	95.7%	31.4%	99.4%	±0.8%		
Biomet Müller (CPT steel)	1997–2004	948	94.7%	46.9%	96.3%	±1.3%		
Biomet Müller (RX90-S)	1994–2001	1,452	76.8%	51.2%	97.8%	±0.8%	93.9%	±1.8%
Biomet Müller (Stanmore modular)	1997–2002	94	95.7%	44.7%	98.9%	±1.6%		
Cenator (Bi-Metric cem.)	1993–1999	293	70.6%	39.6%	97.1%	±2.0%	91.3%	±3.9%
Cenator (Cenator)	1993–2000	1,221	60.0%	44.6%	92.8%	±1.6%	83.9%	±3.0%
Cenator (Charnley Elite Plus)	1996–2000	320	83.8%	48.8%	96.7%	±2.0%		
Cenator (Cone uncem.)	1994–2000	56	60.7%	10.7%	96.4%	±4.3%		
Cenator (Exeter Polished)	1998–2003	660	84.5%	54.1%	99.5%	±0.5%		
Cenator (Lubinus SP II)	1997–2000	63	50.8%	63.5%	94.2%	±6.0%		
Charnley (Bi-Metric cem.)	1992–1998	58	48.3%	32.8%	96.1%	±4.6%		
Charnley (CAD)	1992–1996	225	62.7%	51.6%	97.2%	±2.2%	95.4%	±3.0%
Charnley (Charnley Elite Plus)	1994–2003	1,407	69.5%	49.3%	96.5%	±1.0%	91.3%	±2.3%
Charnley (Charnley)	1992–2005	23,164	75.5%	53.6%	96.4%	±0.3%	92.2%	±0.5%
Charnley (CPT steel)	1996–2004	193	72.5%	50.8%	98.1%	±2.0%		
Charnley (Exeter Polished)	1992–2005	1,920	79.2%	56.6%	98.3%	±0.7%	97.1%	±1.4%
Charnley (Lubinus SP II)	1992–2005	335	83.%	59.1%	97.5%	±1.8%	95.2%	±2.6%
Charnley (Müller Straight)	1992–1998	104	87.5%	71.2%	96.9%	±3.3%	95.7%	±4.1%
Charnley (PCA E-series Textured)	1992–1996	129	82.2%	53.5%	96.8%	±3.1%	83.4%	±7.0%
Charnley Elite (ABG uncem.)	1994–2005	369	90.8%	22.2%	97.7%	±1.5%		
Charnley Elite (Charnley Elite Plus)	1992–2002	943	67.6%	48.7%	94.7%	±1.6%		
Charnley Elite (Charnley)	1992–2001	337	60.5%	52.2%	95.6%	±2.3%	88.5%	±4.1%
Charnley Elite (CPT steel)	1997–2003	115	73.0%	47.0%	93.7%	±4.6%		
Charnley Elite (Exeter Polished)	1996–2005	5,381	71.0%	50.8%	98.9%	±0.4%		
Charnley Elite (Lubinus SP II)	1992–2005	1,006	81.9%	55.2%	97.6%	±1.4%	91.4%	±5.9%
Charnley Elite (Müller Straight)	1999–2005	219	79.5%	58.9%	98.7%	±1.5%		
Charnley Elite (PCA E-series Textured)	1992–1997	214	79.9%	56.5%	96.9%	±2.4%	88.3%	±4.9%
Charnley Elite (Spectron EF Primary)	1998–2005	278	89.6%	54.0%	97.6%	±2.1%		
CLS Spotorno (CLS Spotorno)	1992–2005	660	87.1%	26.1%	98.7%	±1.1%	97.0%	±2.2%
Contemporary (Exeter Polished)	1995–2005	324	88.0%	53.1%	96.8%	±2.0%		
Contemporary (Lubinus SP II)	1994–2001	102	66.7%	57.8%	96.9%	±3.3%		
Duralock (uncem) (Spectron EF Primary)	1995–2000	114	87.7%	52.6%	97.4%	±2.8%		
Exeter Duration (Exeter Polished)	1999–2005	9,160	83.5%	52.2%	97.8%	±0.3%		
Exeter Duration (Lubinus SP II)	1999–2005	563	76.6%	50.4%	100.0%	±0.0%		
Exeter Metal-backed (Exeter Polished)	1992–1994	588	68.4%	64.3%	98.7%	±1.0%	95.2%	±2.0%
Exeter All-Poly (Exeter Polished)	1992–2005	6,374	73.0%	51.1%	97.0%	±0.5%	92.7%	±0.8%
Exeter All-Poly (Lubinus SP II)	1992–2002	202	79.2%	47.0%	96.7%	±2.6%		
Exeter Polished (Exeter Polished)	1992–1995	669	68.8%	51.3%	95.9%	±1.5%	92.5%	±2.3%
FAL (Lubinus SP II)	1999–2005	3,507	78.7%	52.7%	98.9%	±0.4%		
Harris-Galante I (Lubinus SP II)	1992–1997	72	76.4%	19.4%	97.2%	±3.4%	92.2%	±6.6%
Harris-Galante II (Charnley)	1992–1996	143	85.3%	28.0%	92.9%	±4.3%	86.1%	±5.8%
Harris-Galante II (Lubinus SP II)	1992–1997	237	62.4%	27.8%	94.9%	±2.8%	84.0%	±4.8%

(continued on next page)

Implant Survival per Type (cont.)

all diagnoses and reasons for revision, 1992-2005

Cup (Stem)	Period [1]	Number [2]	OA [3]	60-75 yrs [4]	5 yrs	95% CI	10 yrs	95% CI
Harris-Galante II (Spectron EF)	1992–1996	161	73.3%	56.5%	96.2%	±3.0%	87.8%	±5.3%
HGPII/HATCP (HG III) (Spectron EF)	1992–1995	93	52.7%	47.3%	100.0%	±0.0%	96.6%	±3.6%
Inter-op cup (CLS Spotorno)	1999–2001	58	86.2%	22.4%	96.6%	±4.0%		
ITH (ITH)	1992–1997	314	58,3%	38.2%	98.5%	±1.5%	96.4%	±2.6%
LINK Pressfit (Lubinus SP II)	1996–2000	61	62.3%	8.2%	100.0%	±0.0%		
Lubinus All-Poly (Lubinus IP)	1992–1998	826	55.6%	41.4%	99.3%	±0.6%	98.4%	±1.1%
Lubinus All-Poly (Lubinus SP II)	1992–2005	50,132	77.8%	54.8%	98.3%	±0.1%	96.3%	±0.3%
Mallory-Head uncem (Lubinus SP II)	1995–2005	98	82.7%	9.2%	96.7%	±3.5%		
Müller All-Poly (Bi-Metric cem)	1992–1994	64	82.8%	56.3%	98.4%	±2.3%		
Müller All-Poly (MS30 Unpolished)	1992–2001	113	58.4%	57.5%	94.2%	±4.6%		
Müller All-Poly (Müller Straight)	1992–2005	1,628	73.8%	59.1%	97.3%	±0.9%	96.3%	±1.1%
Müller All-Poly (Straight-stem standard)	1996–2005	178	93.3%	56.2%	95.4%	±4.0%		
Omnifit (Lubinus SP II)	1992–1995	171	80.1%	28.7%	95.9%	±3.0%	77.4%	±6.4%
Omnifit (Omnifit)	1992–1996	319	57.7%	11.9%	91.8%	±3.0%	65.5%	±5.3%
OPTICUP (Lubinus SP II)	1995–2005	649	57.9%	49.8%	98.5%	±1.0%		
OPTICUP (NOVA Scan Hip)	1993–2000	156	66.0%	41.7%	91.0%	±4.7%	72.4%	±9.1%
OPTICUP (Optima)	1993–2000	756	73.7%	50.1%	96.6%	±1.4%	88.6%	±2.9%
OPTICUP (Scan Hip II Collar)	1996–2004	1,980	76.0%	48.4%	96.6%	±0.9%		
OPTICUP (Scan Hip Collar)	1995–1996	82	79.3%	51.2%	97.0%	±3.5%		
PCA (PCA)	1992–1994	70	70.0%	22.9%	95.7%	±4.5%	85.0%	±8.6%
Reflection (Spectron EF Primary)	1996–2005	6,242	74.5%	51.6%	97.7%	±0.5%	94.6%	±1.5%
Reflection (Spectron EF)	1992–1996	887	66.2%	55.9%	98.6%	±0.8%	95.9%	±1.6%
Reflection HA (Lubinus SP II)	1995–2005	186	86.6%	13.4%	94.6%	±3.9%		
Reflection HA (Spectron EF Primary)	1996–2000	98	80.6%	24.5%	93.7%	±4.9%		
Romanus (Bi-Metric cem.)	1992–1998	369	76.4%	30.4%	95.8%	±2.1%	85.3%	±3.9%
Romanus (Bi-Metric HA uncem.)	1992–1999	141	83.0%	16.3%	99.3%	±1.0%	92.5%	±4.5%
Romanus (Bi-Metric uncem.)	1992–1997	259	70.7%	10.0%	96.5%	±2.3%	87.0%	±4.2%
Romanus (Lubinus SP II)	1992–1996	97	73.2%	18.6%	97.9%	±2.5%	89.1%	±6.4%
Romanus (RX90-S)	1994–2000	181	90.6%	38.7%	96.1%	±2.9%	84.7%	±5.8%
Romanus HA (Bi-Metric HA uncem.)	1992–2005	258	74.8%	10.5%	96.0%	±2.4%	89.5%	±6.5%
Romanus HA (Bi-Metric uncem.)	1992–1999	53	79.2%	13.2%	96.2%	±4.5%		
Scan Hip Cup (Lubinus SP II)	1992–2002	91	56.0%	46.2%	95.3%	±4.5%		
Scan Hip Cup (Optima)	1993–2001	505	70.5%	56.4%	98.5%	±1.1%	92.8%	±3.3%
Scan Hip Cup (Scan Hip II Collar)	1996–2001	207	75.8%	39.6%	96.8%	±2.5%		
Scan Hip Cup (Scan Hip Collar)	1992–2000	2,874	71.0%	49.9%	97.8%	±0.5%	91.9%	±1.3%
Scan Hip Cup (Scan Hip Collarless)	1992–1999	136	67.6%	48.5%	98.5%	±1.8%	90.6%	±6.0%
Secur-Fit (Omnifit)	1996–1999	104	72.1%	2.9%	89.1%	±6.1%		
SHP (Lubinus SP II)	1994–2005	612	80.6%	52.5%	99.4%	±0.6%	96.9%	±2.4%
SLS (CLS Spotorno)	1992–1998	66	81.8%	33.3%	96.9%	±3.6%		
Spectron Metal-backed (Spectron EF)	1992–1993	113	77.0%	62.8%	99.1%	±1.3%	99.1%	±1.3%
Stanmore (Stanmore mod)	1994–2005	610	48.0%	46.9%	98.6%	±1.0%		
Stanmore (Stanmore)	1992–1998	104	87.5%	54.8%	96.8%	±3.4%	89.6%	±6.9%
Trilogy (CLS Spotorno)	1998–2005	297	79.5%	31.6%	96.4%	±4.1%		
Trilogy (Cone uncem)	1998–2005	158	43.0%	20.3%	94.3%	±4.5%		
Trilogy HA (Anatomic HA/HATCP (HG V))	1994–1999	57	82.5%	22.8%	94.7%	±5.6%		
Trilogy HA (Lubinus SP II)	1995–2005	922	84.2%	43.1%	96.8%	±1.3%		
Trilogy HA (Optima)	1995–1999	96	94.8%	43.8%	96.8%	±3.4%		
Trilogy HA (Spectron EF Primary)	1996–2005	1,081	74.5%	47.7%	98.0%	±1.1%		
Weber All-poly (Straight-stem standard)	1999–2005	833	99.4%	65.9%	98.6%	±0.9%		
ZCA (CPT steel)	1993–2005	114	77.2%	43.9%	94.3%	±4.4%		

Implant Survival per Type

osteoarthritis and aseptic loosening, 1992-2005

Cup (Stem)	Period [1]	Number [2]	60-75 yrs [4]	5 yrs	95% CI	10 yrs	95% CI
ABG HA (ABG cem.)	1992–1998	142	24.6%	100.0%	±0.0%	93.5%	±5.0%
ABG HA (ABG uncem.)	1992–1998	223	5.8%	98.6%	±1.5%	83.3%	±5.3%
ABG HA (Lubinus SP II)	1992–1998	270	46.7%	99.6%	±0.6%	92.4%	±3.8%
ABG II HA (ABG uncem.)	1997–2005	157	8.3%	100.0%	±0.0%		
ABG II HA (Lubinus SP II)	1997–2004	167	32.3%	99.2%	±1.1%		
Biomet Müller (Bi-Metric cem.)	1992–1995	731	59.8%	97.2%	±1.3%	91.5%	±2.3%
Biomet Müller (Bi-Metric HA uncem.)	1995–2005	180	32.2%	100.0%	±0.0%		
Biomet Müller (CPT steel)	1997–2003	898	47.7%	99.5%	±0.5%		
Biomet Müller (RX90-S)	1994–2001	1,115	54.9%	99.1%	±0.6%	95.4%	±1.9%
Biomet Müller (Stanmore modular)	1997–2002	90	44.4%	98.9%	±1.6%		
Cenator (Bi-Metric cem.)	1993–1999	207	45.9%	98.5%	±1.6%	92.8%	±4.4%
Cenator (Cenator)	1993–2000	732	53.4%	94.5%	±1.8%	86.6%	±3.4%
Cenator (Charnley Elite Plus)	1997–2000	268	52.6%	98.4%	±1.6%		
Cenator (Exeter Polished)	1998–2003	558	56.3%	99.8%	±0.3%		
Charnley (CAD)	1992–1996	141	61.7%	98.5%	±1.8%	95.8%	±3.7%
Charnley (Charnley Elite Plus)	1994–2002	978	52.7%	98.5%	±0.8%	93.1%	±2.5%
Charnley (Charnley)	1992–2005	17,495	57.0%	98.0%	±0.2%	94.4%	±0.5%
Charnley (Exeter Polished)	1992–2005	1,520	61.3%	100.0%	±0.0%	99.1%	±1.1%
Charnley (Lubinus SP II)	1992–2004	278	62.2%	99.2%	±1.0%	97.7%	±2.1%
Charnley (Müller Straight)	1992–1998	91	73.6%	98.8%	±1.8%	97.3%	±3.2%
Charnley (PCA E-series Textured)	1992–1996	106	57.5%	97.1%	±3.1%	83.5%	±7.7%
Charnley Elite (ABG uncem)	1994–2005	335	24.2%	99.7%	±0.5%		
Charnley Elite (Charnley Elite Plus)	1992–2002	637	51.2%	96.1%	±1.6%		
Charnley Elite (Charnley)	1992–2001	204	59.3%	94.7%	±3.2%	90.6%	±4.4%
Charnley Elite (CPT steel)	1997–2003	84	48.8%	97.5%	±3.0%		
Charnley Elite (Exeter Polished)	1996–2005	3,823	55.5%	99.9%	±0.1%		
Charnley Elite (Lubinus SP II)	1992–2005	824	58.1%	98.6%	±1.3%	95.1%	±4.3%
Charnley Elite (Müller Straight)	1999–2005	174	60.9%	100.0%	±0.0%		
Charnley Elite (PCA E-series Textured)	1992–1997	171	57.9%	98.2%	±2.0%	89.0%	±5.3%
Charnley Elite (Spectron EF Primary)	1998–2005	249	57.8%	98.9%	±1.3%		
CLS Spotorno (CLS Spotorno)	1992–2005	575	28.5%	100.0%	±0.0%	98.8%	±1.5%
Contemporary (Exeter Polished)	1995–2004	285	54.4%	98.5%	±1.5%		
Contemporary (Lubinus SP II)	1994–2001	68	64.7%	100.0%	±0.0%		
Duralock (uncem) (Spectron EF Primary)	1995–2000	100	55.0%	98.0%	±2.4%		
Exeter Duration (Exeter Polished)	1999–2005	7,650	54.4%	99.5%	±0.3%		
Exeter Duration (Lubinus SP II)	1999–2005	431	54.1%	100.0%	±0.0%		
Exeter Metal-backed (Exeter Polished)	1992–1994	402	67.7%	99.2%	±0.9%	95.6%	±2.3%
Exeter All-Poly (Exeter Polished)	1992–2005	4,655	55.9%	98.8%	±0.3%	95.7%	±0.8%
Exeter All-Poly (Lubinus SP II)	1992–2002	160	48.1%	97.2%	±2.7%		
Exeter Polished (Exeter Polished)	1992–1995	460	55.7%	97.7%	±1.4%	94.8%	±2.3%
FAL (Lubinus SP II)	1999–2005	2,760	56.4%	100.0%	±0.1%		
Harris-Galante I (Lubinus SP II)	1992–1997	55	25.5%	100.0%	±0.0%		
Harris-Galante II (Charnley)	1992–1996	122	30.3%	98.3%	±2.0%	95.6%	±3.9%
Harris-Galante II (Lubinus SP II)	1992–1997	148	22.3%	98.6%	±1.6%	88.1%	±5.5%
Harris-Galante II (Spectron EF)	1992–1996	118	61.0%	100.0%	±0.0%	95.1%	±4.2%
ITH (ITH)	1992–1996	183	45.4%	98.8%	±1.5%	97.3%	±2.6%

(continued on next page)

Implant Survival per Type (cont.)

osteoarthritis and aseptic loosening, 1992-2005

Cup (Stem)	Period [1]	Number [2]	60-75 yrs [4]	5 yrs	95% CI	10 yrs	95% CI
Lubinus All-Poly (Lubinus IP)	1992–1998	459	49.5%	99.3%	±0.8%	98.4%	±1.4%
Lubinus All-Poly (Lubinus SP II)	1992–2005	39,006	58.7%	99.6%	±0.1%	98.0%	±0.3%
Mallory-Head uncem. (Lubinus SP II)	1995–2005	81	8.6%	100.0%	±0.0%		
Müller All-Poly (MS30 Unpolished)	1992–2001	66	71.2%	98.4%	±2.4%		
Müller All-Poly (Müller Straight)	1992–2005	1,202	65.6%	99.6%	±0.4%	98.5%	±1.0%
Müller All-Poly (Straight-stem standard)	1996–2005	166	56.0%	97.7%	±2.7%		
Omnifit (Lubinus SP II)	1992–1995	137	28.5%	97.8%	±2.4%	77.4%	±7.3%
Omnifit (Omnifit)	1992–1996	184	17.4%	92.8%	±3.8%	66.1%	±7.0%
OPTICUP (Lubinus SP II)	1995–2005	376	53.7%	99.4%	±0.8%		
OPTICUP (NOVA Scan Hip)	1993–2000	103	49.5%	90.7%	±5.8%		
OPTICUP (Optima)	1994–2000	557	56.4%	97.6%	±1.4%	90.4%	±3.0%
OPTICUP (Scan Hip II Collar)	1996–2004	1,504	52.3%	98.2%	±0.8%		
OPTICUP (Scan Hip Collar)	1995–1996	65	58.5%	98.2%	±2.6%		
Reflection (Spectron EF Primary)	1996–2005	4,652	54.7%	99.1%	±0.4%	96.7%	±1.4%
Reflection (Spectron EF)	1992–1996	587	58.9%	99.6%	±0.5%	97.8%	±1.5%
Reflection HA (Lubinus SP II)	1995–2005	161	13.0%	95.9%	±4.0%		
Reflection HA (Spectron EF Primary)	1996–2000	79	29.1%	96.0%	±4.2%		
Romanus (Bi-Metric cem.)	1992–1998	282	33.7%	97.1%	±2.0%	89.0%	±4.0%
Romanus (Bi-Metric HA uncem.)	1992–1999	117	19.7%	100.0%	±0.0%	92.6%	±4.9%
Romanus (Bi-Metric uncem.)	1992–1997	183	12.0%	99.4%	±0.9%	92.8%	±3.9%
Romanus (Lubinus SP II)	1992–1996	71	22.5%	98.6%	±2.1%	90.9%	±7.0%
Romanus (RX90-S)	1994–2000	164	40.9%	96.9%	±2.7%	87.0%	±5.8%
Romanus HA (Bi-Metric HA uncem.)	1992–2005	193	12.4%	100.0%	±0.0%		
Scan Hip Cup (Optima)	1993–2001	356	62.4%	99.7%	±0.5%	97.6%	±2.1%
Scan Hip Cup (Scan Hip II Collar)	1996–2001	157	45.2%	99.3%	±1.0%		
Scan Hip Cup (Scan Hip Collar)	1992–2000	2,041	55.2%	98.8%	±0.5%	93.3%	±1.3%
Scan Hip Cup (Scan Hip Collarless)	1992–1995	92	58.7%	100.0%	±0.0%	91.1%	±6.9%
Secur-Fit (Omnifit)	1996–1999	75	2.7%	95.8%	±4.5%		
SHP (Lubinus SP II)	1994–2005	493	56.2%	100.0%	±0.0%	98.3%	±2.0%
Spectron Metal-backed (Spectron EF)	1992–1993	87	66.7%	100.0%	±0.0%	100.0%	±0.0%
Stanmore (Stanmore mod.)	1994–2005	293	60.8%	100.0%	±0.0%		
Stanmore (Stanmore)	1992–1998	91	58.2%	97.6%	±2.9%	91.2%	±6.8%
Trilogy HA (Lubinus SP II)	1995–2005	776	45.9%	99.3%	±0.8%		
Trilogy HA (Optima)	1995–1999	91	44.0%	97.8%	±2.6%		
Trilogy HA (Spectron EF Primary)	1996–2005	805	55.0%	99.2%	±0.9%		
Weber All-poly cup (Straight-stem standard)	1999–2005	828	66.3%	99.6%	±0.5%		
ZCA (CPT steel)	1993–2004	88	50.0%	96.2%	±4.0%		

[1] First and last observed year of primary THR.
[2] Number of primary THRs during the period with the conditions specified in the table heading.
[3] Percentage of primary THRs performed due to primary osteoarthritis.
[4] Percentage of primary THRs in the age-group 60-75 years (age at primary operation).

Certain implants do not have a sufficient number of primary operations during the period to give a 10-year implant survival value. To be able to calculate the 10-year survival, the longest observed time between the primary operation and revision must be at least 10 years. A condition which has consistently been applied in the survival statistics from the register is that only values where at least 50 patients "at risk" remain are shown. Implants with smaller production may therefore lack values for this reason. Only implants with a 5-year survival are included in the table.

Implant Survival per Hospital

all diagnoses, all reasons for revision and all types of implants, 1992-2005

Cup (Stem)	Period [1]	Number [2]	OA [3]	60-75 yrs [4]	5 yrs	95% CI	10 yrs	95% CI
University/Regional Hospitals								
Huddinge	1992–2005	2,856	64.4%	44.9%	95.4%	±1.0%	86.9%	±2.0%
Karolinska	1992–2005	2,584	58.1%	44.8%	95.3%	±1.0%	88.4%	±2.5%
Linköping	1992–2005	2,553	67.5%	43.8%	99.1%	±0.5%	96.3%	±1.3%
Lund	1992–2005	2,064	49.2%	40.9%	96.7%	±0.9%	87.5%	±2.2%
Malmö	1992–2005	2,949	50.9%	45.3%	95.7%	±0.8%	87.8%	±1.7%
SU/Sahlgrenska	1992–2005	2,798	60.9%	40.4%	97.8%	±0.6%	91.5%	±1.8%
SU/Östra	1992–2005	2,204	75.8%	49.5%	97.6%	±0.7%	93.5%	±1.5%
Umeå	1992–2005	1,620	70.4%	48.5%	97.5%	±0.8%	95.0%	±1.4%
Uppsala	1992–2005	3,648	54.9%	39.2%	94.7%	±0.9%	86.7%	±1.9%
Central Hospitals								
Borås	1992–2005	2,541	68.2%	48.2%	97.5%	±0.6%	94.9%	±1.3%
Danderyd	1992–2005	4,008	85.5%	44.4%	96.8%	±0.6%	93.8%	±1.3%
Eksjö	1992–2005	2,422	84.3%	53.8%	96.8%	±0.8%	93.1%	±1.5%
Eskilstuna	1992–2005	1,890	59.5%	47.4%	97.9%	±0.7%	95.6%	±1.3%
Falun	1992–2005	2,065	82.6%	51.8%	96.6%	±1.1%		
Gävle	1992–2005	2,063	70.5%	47.3%	96.6%	±0.9%	88.7%	±3.3%
Halmstad	1992–2005	2,297	65.2%	47.8%	97.3%	±0.8%	92.8%	±2.0%
Helsingborg	1992–2005	1,978	72.4%	49.8%	96.5%	±0.9%	87.0%	±2.5%
Hässleholm-Kristianstad	1992–2005	4,882	84.8%	53.8%	97.9%	±0.6%	94.0%	±1.3%
Jönköping	1992–2005	2,288	80.6%	50.8%	97.2%	±0.8%	94.5%	±1.4%
Kalmar	1992–2005	2,518	65.1%	48.5%	98.2%	±0.6%	95.4%	±1.4%
Karlskrona	1992–2005	1,100	71.0%	47.8%	95.5%	±1.3%	89.1%	±2.6%
Karlstad	1992–2005	2,031	68.9%	48.3%	97.4%	±0.8%	93.3%	±1.9%
Norrköping	1992–2005	2,847	67.3%	47.9%	98.2%	±0.5%	92.1%	±1.8%
S:t Göran	1992–2005	5,966	73.6%	45.7%	94.8%	±0.6%	88.9%	±1.4%
Skövde	1992–2005	2,283	71.5%	45.6%	96.6%	±0.9%	89.3%	±2.1%
SU/Mölndal	1992–2005	1,661	75.8%	51.7%	97.1%	±0.9%	91.9%	±2.3%
Sunderby	1992–2005	2,104	63.0%	48.5%	97.0%	±0.8%	91.2%	±1.8%
Sundsvall	1992–2005	2,554	82.8%	52.0%	96.2%	±0.8%	92.9%	±1.5%
Södersjukhuset	1992–2005	3,806	57.8%	41.1%	98.2%	±0.5%	94.4%	±1.3%
Uddevalla	1992–2005	2,925	69.5%	49.7%	97.6%	±0.7%	92.8%	±1.7%
Varberg	1992–2005	2,337	84.0%	52.1%	97.2%	±0.8%	91.6%	±2.0%
Västerås	1992–2005	1,677	67.4%	51.6%	97.7%	±0.8%	93.5%	±2.0%
Växjö	1992–2005	1,454	82.9%	53.9%	97.7%	±0.9%	94.4%	±1.9%
Ystad	1992–2005	1,459	78.1%	49.2%	97.1%	±0.9%	94.9%	±1.8%
Örebro	1992–2005	2,496	72.1%	49.7%	98.6%	±0.5%	95.8%	±1.3%
Östersund	1992–2005	2,098	81.0%	52.9%	97.5%	±0.8%	94.0%	±1.6%
Rural Hospitals								
Alingsås	1992–2005	1,381	84.1%	58.9%	98.8%	±0.7%	97.0%	±1.5%
Arvika	1992–2005	715	83.9%	56.6%	92.4%	±2.5%	83.7%	±5.1%
Bollnäs	1992–2005	1,652	84.7%	56.4%	98.0%	±0.8%	94.6%	±2.4%
Enköping	1992–2005	1,080	94.2%	59.7%	97.1%	±1.3%	88.1%	±5.3%
Falköping	1992–2005	1,828	86.1%	57.3%	97.6%	±0.9%	90.9%	±2.8%
Frölunda Specialistsjukhus	2002–2005	144	99.3%	61.1%				

(continued on next page)

Implant Survival per Hospital (cont.)

all diagnoses, all reasons for revision and all types of implants, 1992-2005

Cup (Stem)	Period [1]	Number [2]	OA [3]	60-75 yrs [4]	5 yrs	95% CI	10 yrs	95% CI
Gällivare	1992–2005	1,243	80.0%	55.5%	98.7%	±0.7%	96.7%	±1.7%
Hudiksvall	1992–2005	1,669	75.5%	53.4%	97.7%	±0.8%	96.2%	±1.4%
Karlshamn	1992–2005	1,377	90.2%	49.4%	97.8%	±0.9%	95.6%	±1.9%
Karlskoga	1992–2005	1,365	86.7%	51.9%	98.0%	±0.9%	94.1%	±2.5%
Katrineholm	1992–2005	1,659	88.4%	53.3%	98.8%	±0.7%	97.7%	±1.2%
Kungälv	1992–2005	1,925	86.7%	56.3%	99.2%	±0.5%	96.0%	±2.3%
Köping	1992–2005	1,900	92.3%	57.5%	99.1%	±0.6%	96.1%	±2.4%
Lidköping	1992–2005	1,181	89.2%	51.7%	98.5%	±0.8%	88.9%	±7.7%
Lindesberg	1992–2005	1,359	81.2%	52.7%	98.1%	±0.9%	96.0%	±1.9%
Ljungby	1992–2005	1,428	87.7%	53.9%	98.3%	±0.8%	95.8%	±1.6%
Lycksele	1992–2005	1,837	81.5%	57.8%	98.8%	±0.6%	97.3%	±1.5%
Mora	1992–2005	1,820	85.8%	54.2%	97.3%	±0.9%	94.1%	±1.7%
Motala	1992–2005	2,023	79.1%	50.5%	99.0%	±0.6%	95.8%	±2.0%
Norrtälje	1992–2005	1,127	75.1%	49.9%	96.7%	±1.2%	95.8%	±1.8%
Nyköping	1992–2005	1,544	81.4%	56.2%	98.0%	±0.8%	97.1%	±1.2%
Oskarshamn	1992–2005	1,249	82.2%	53.6%	99.4%	±0.6%	96.3%	±2.3%
Piteå	1992–2005	1,131	84.3%	55.5%	98.2%	±1.0%	96.5%	±1.8%
Simrishamn	1992–2005	1,082	92.8%	59.6%	98.3%	±1.2%	90.9%	±3.6%
Skellefteå	1992–2005	1,633	75.7%	53.5%	97.8%	±0.8%	97.0%	±1.0%
Skene	1992–2005	948	91.7%	56.5%	98.4%	±1.0%	94.8%	±2.5%
Sollefteå	1992–2005	1,248	86.9%	54.6%	97.5%	±1.0%	93.6%	±2.4%
Södertälje	1995–2005	1,002	83.9%	53.6%	99.2%	±0.7%		
Torsby	1992–2005	885	81.5%	57.1%	97.2%	±1.3%	89.2%	±3.9%
Trelleborg	1992–2005	2,376	79.5%	47.9%	96.5%	±1.0%	93.4%	±1.7%
Visby	1992–2005	1,053	82.2%	53.6%	94.3%	±1.6%	88.0%	±3.0%
Värnamo	1992–2005	1,352	83.1%	53.5%	98.6%	±0.8%	95.8%	±1.8%
Västervik	1992–2005	1,390	79.8%	52.6%	97.7%	±0.8%	94.5%	±2.0%
Ängelholm	1992–2005	1,810	75.9%	49.0%	97.4%	±0.9%	91.9%	±2.3%
Örnsköldsvik	1992–2005	1,533	81.2%	55.5%	99.3%	±0.5%	98.3%	±1.0%
Private Hospitals								
Carlanderska	1992–2005	589	93.4%	49.6%	98.6%	±1.1%	95.2%	±3.4%
Elisabethsjukhuset	1999–2005	438	88.4%	58.4%	96.7%	±3.3%		
Gothenburg Medical Center	2004–2005	59	100.0%	61.0%				
Movement	2003–2005	104	98.1%	58.7%				
Nacka Närsjukhus Proxima AB	2005–2005	17	94.1%	35.3%				
Ortopediska Huset	1996–2005	1,197	98.5%	58.1%	97.4%	±1.5%		
Sophiahemmet	1992–2005	2,276	97.2%	53.7%	95.1%	±1.1%	85.5%	±3.0%
Stockholms Specialistvård AB	2000–2005	648	96.9%	59.0%	98.2%	±1.2%		

[1] First and last observed year of primary THR.
[2] Number of primary THRs during the period with the conditions specified in the table heading.
[3] Percentage of primary THRs performed due to primary osteoarthritis.
[4] Percentage of primary THRs in the age-group 60-75 years (age at primary operation).

Certain hospitals do not have a sufficient number of primary operations during the period to give a 10-year implant survival value. To be able to calculate the 10-year survival, the longest observed time between the primary operation and revision must be at least 10 years. We have therefore chosen to present the 5-year survival as well. A condition which has consistently been applied in the survival statistics from the register is that only values where at least 50 patients "at risk" remain are shown. Hospitals with smaller production may therefore lack values for this reason. All hospitals that have reported to the register during 2005 are included in the table, even if values are lacking.

Environmental and technical profile

In the environmental profile, the units report their surgical technique and surgical environment every year. It is important to be aware that each hospital must update its environmental profile via the website. If it does not, it is assumed that the environmental profile/surgical technique is unchanged from the previous year. Since the environmental profile is based on aggregated data per hospital per year, this leads to uncertainty in statistical analyses of the database. The primary and revision databases are based on the individual operation, the patient's personal identity number and the side as unique variables.

In 2005, the brand names of the dominant cement types that are used in Sweden were changed:

- **Palacos with gentamycin** has changed its name to **Palacos R+G.**
- **Rebofacin Palacos** has changed its name to **Rebofacin Bone Cement.**

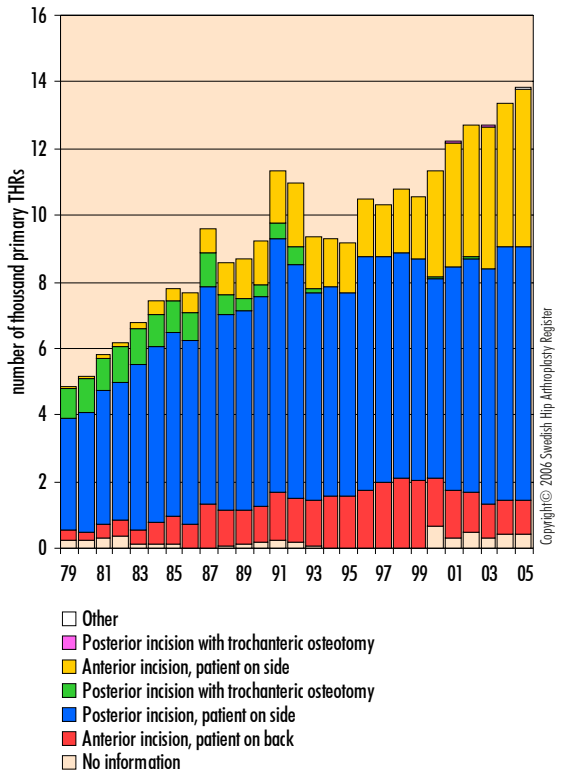
The characteristics and similarities/differences between the "new" cements and the "old" ones are currently being investigated using polymer-chemical and durability studies. The "new" cements were introduced successively and with some variability between different clinics during the autumn of 2005. At the start of the year (1/1/2006), the change had been fully implemented at all units and all the cement packaging types will therefore be registered in the environmental profile using the new designations. The historical materials will retain the previous designations.

For many years, most hospitals have been using a very similar technique. When it comes to cementing techniques, there are currently two clear-cut trends.

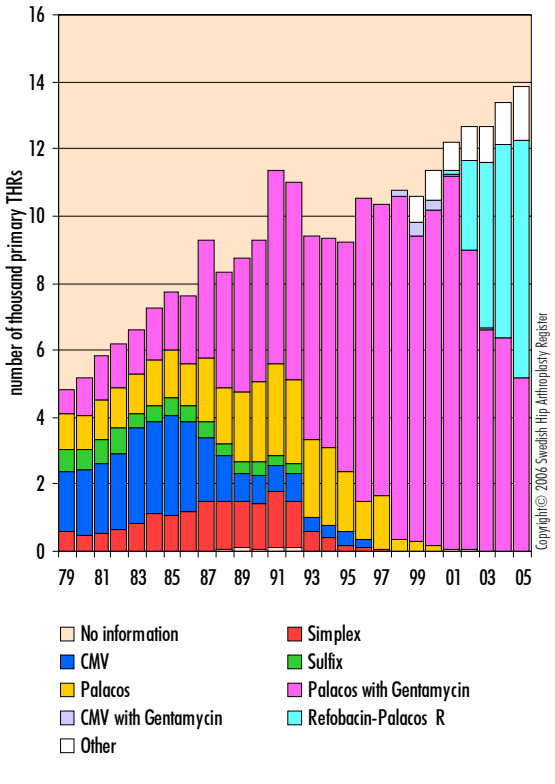
The use of brushes declined for the fifth year in succession. In previous multivariate analyses, we have not found that the use of brushes produces any positive effects. When it comes to the cleaning of the cement bed, meticulous, repeated high-pressure lavage probably has a better effect.

The use of a proximal femoral seal is once again increasing. In 2004, more than 15% of the clinics stated that they did not use this technique. In 2005, this percentage fell to 8%. If a proximal plug is not used, the opportunity for good cement penetration, which is an important

Type of Incision
1979-2005

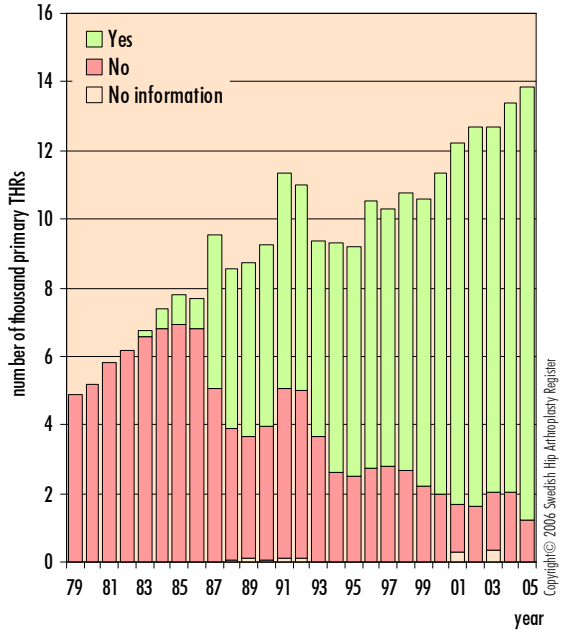


Type of Cement
1979-2005



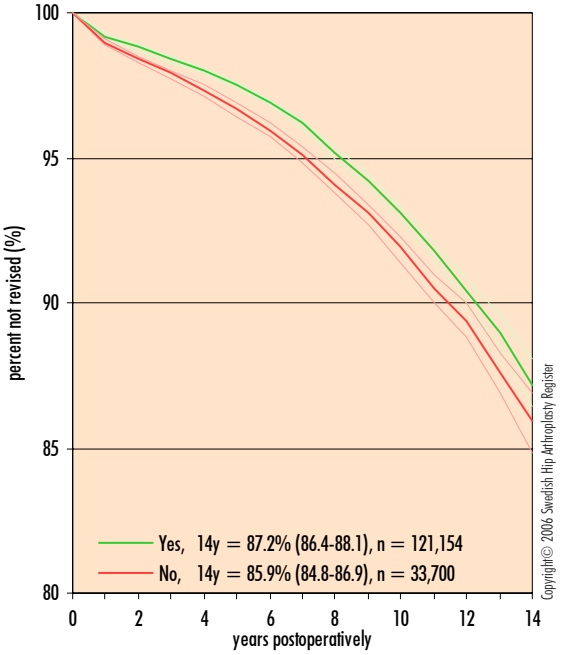
Proximal Femoral Sealing

1979-2005



Proximal Femoral Sealing

all diagnoses and all reasons, 1992-2005



part of the so-called modern cementing technique, is not utilised. Poisson analyses have shown that the use of a proximal plug reduces the long-term risk of aseptic loosening. The reason why some clinics hesitate about using the technique is probably based on anxiety about the increased risk of thromboembolic complications. This risk can, however, be reduced by the careful cleaning of the bone bed (high-pulsatile lavage) prior to cementing. This has been scientifically tested in a number of studies. The recommendation is clear cut: the use of a proximal seal with high-pulsatile lavage both before and after the application of the distal femoral restrictor is essential for both cement penetration and a lower risk of embolism.

A Kaplan-Meier analysis of 155,000 patients operated on during the period 1992-2005 revealed a 14-year survival for the patients operated on using high-pressure techniques of 87.2 ± 0.9%, while the corresponding implant survival for those operated on without this technique was 85.9 ± 1.0%. The difference is statistically significant ($p < 0.001$, Log Rank Test).

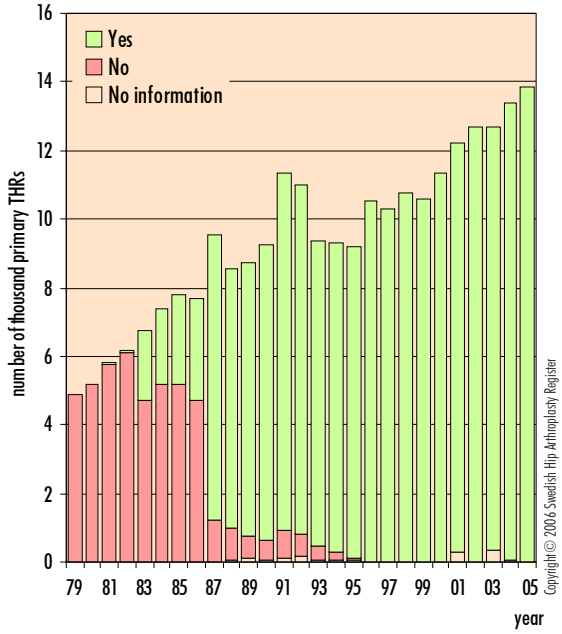
The most common incisions are posterior and anterior incisions in the lateral position. Some 57% of patients are operated on using a posterior incision in the lateral position (Moore) and 33% using an anterior, transgluteal incision. Since 2003, the number of possible incision types has increased on the report page. Three types of mini-incision have been included. Since 2003, 101 patients have undergone surgery using some form of mini-incision (see the following table), which indicates that this type of incision has not succeeded in making itself particularly popular in Sweden. The small number and the short observation period for the patients who have been operated on using a mini-incision do not permit a satisfactory register analysis. The relatively high number of revisions is, however, worrying. This applies in particular to MIS/2 (see the table). A large number of complications for MIS/2 have also been reported internationally.

Incision	No. THR	No. rev.	Share rev.
MIS/2-incision	19	3	15.8%
Ant. incision, pat. on back (Hardinge)	20,512	1,098	5.4%
MIS/1-incision, posterior	27	1	3.7%
MIS/1-incision, anterior	55	2	3.6%
Post. incision, patient on side (Moore)	94,572	3,411	3.6%
(Missing – Incision not specified)	2,929	92	3.1%
Ant. incision, patient on side (Gammer)	36,563	1,139	3.1%

Share of revisions divided on type of incision.

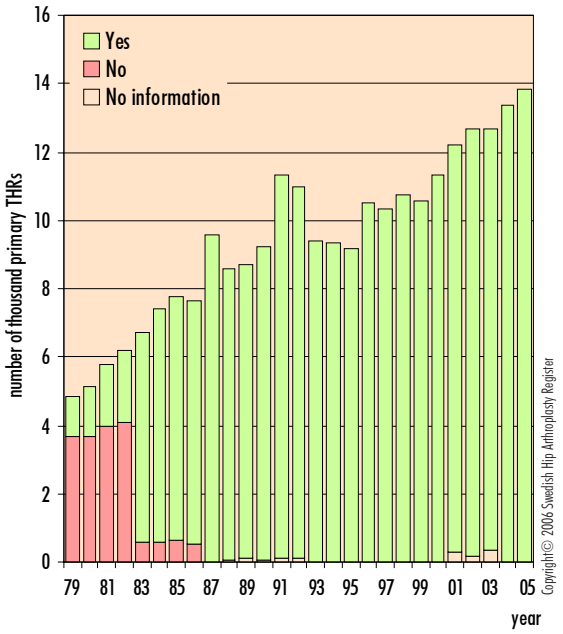
Cleansing by Lavage

1979-2005



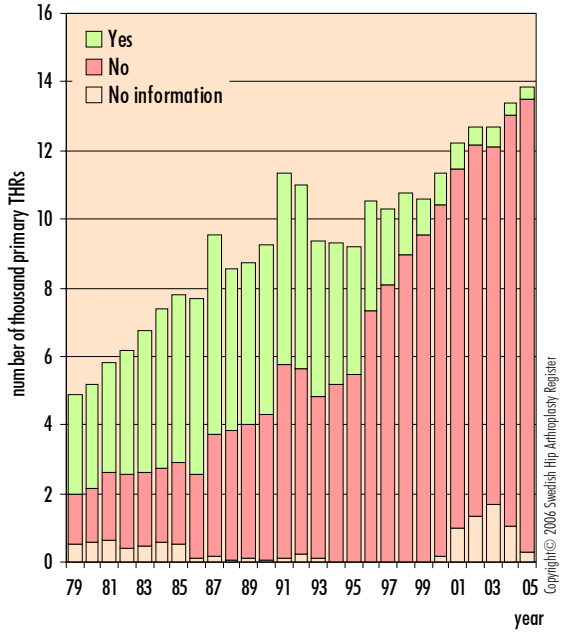
Distal Femoral Plug

1979-2005



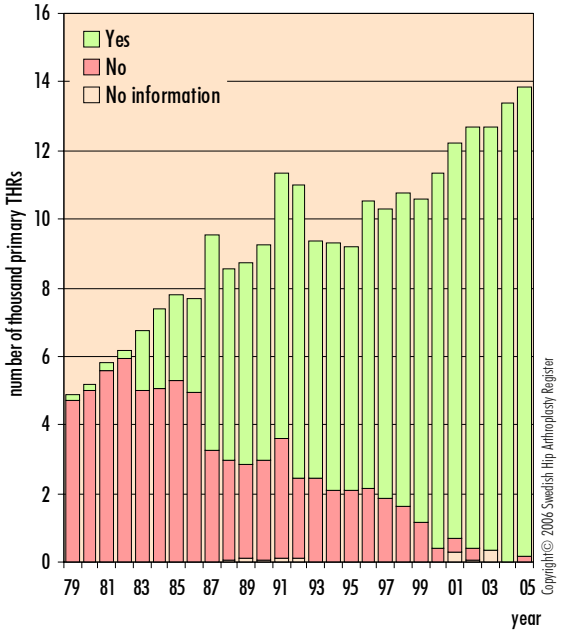
Per Oral Antibiotics

1979-2005



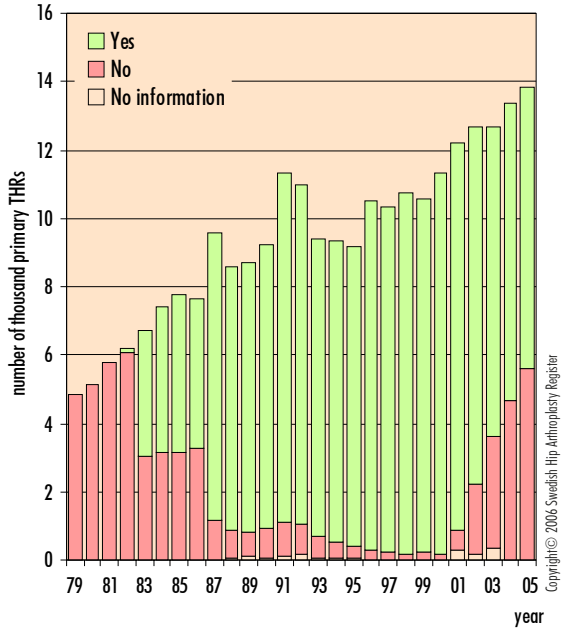
Acetabular Compression

1979-2005



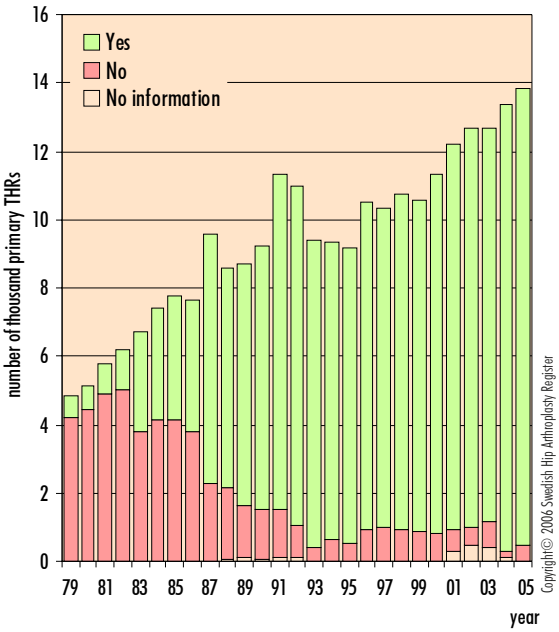
Cleansing by Brush

1979-2005



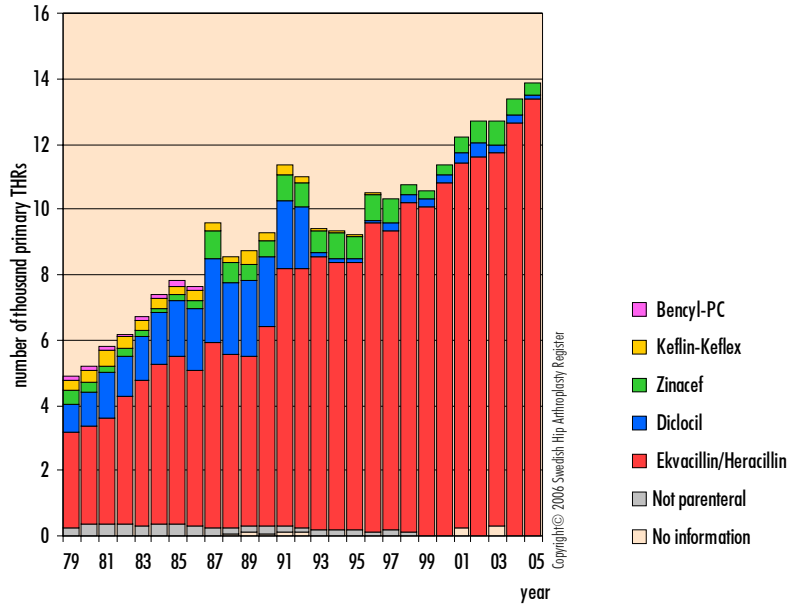
Retrograde Cement-fillning of Femur

1979-2005



Parenteral Brand of Antibiotics

1979-2005



Free choice of care and hip arthroplasty

The structural changes that are currently taking place within Swedish orthopaedics and the introduction of the care guarantee has resulted in an increased flow of patients between different county councils. A number of clinics with surplus capacity and a number of private contractors have produced more rapid access to hip arthroplasty than patients' "home clinics" have been able to offer in many cases. Good, rapid access that has not been quality controlled can, however, hardly be regarded as a satisfactory quality variable.

Prior to last year's annual report, we conducted an analysis of the short-term results for patients undergoing surgery outside their home region between 2002-2003 (see Annual Report 2004, page 52). A short summary of the investigation that formed the basis of the continuation of this analysis now follows:

- To avoid the inclusion of referred patients, only "standard patients", i.e. those with primary osteoarthritis as a diagnosis and undergoing surgery with a cemented THR outside university clinics, were analysed.
- Operated on within the county: 14,785 hips, operated on outside the county: 1,964 hips
- Those patients who took advantage of "the free care choice" had lower co-morbidity (percentage of Charnley C patients) ($p = 0.001$).
- The frequency of re-operation within the county 1.2% and outside the county 1.5% ($p = 0.33$)
- Some 80% of the patients who underwent surgery outside their home region and required a re-operation were dealt with at their home clinic but with a significantly longer waiting time compared with patients who underwent re-operations at their primary clinic.
- Patient-related outcome measured using a pain VAS, satisfaction VAS and EQ-5D index did not reveal any significant difference between the two groups, even if it should be noted that the free-flow patients had a different demographic profile. They should therefore have had a slightly higher EQ-5D index and be somewhat more satisfied, as the percentage of C patients was significantly lower compared with the comparison group.

To summarise, the analysis did not reveal any statistically confirmed difference in quality measured in terms of short-term re-operation frequency between patients undergoing surgery at their "home clinic" and those utilising the "free flow". Only after five to 10 years of follow-up is it possible to analyse possible differences in quality in terms of aseptic loosening and revision frequency with any real certainty. We did, however, find factors – questions we felt were worrying from a quality angle.

The patients using the "free flow" were somewhat younger and there were fewer women compared with the national average and they also had a significantly lower co-morbidity and short-term mortality. What happens to the group that is "more ill"? Do they have to wait longer for adequate treatment? Is this fair health care characterised by the concept of solidarity?

Most patients requiring re-operation were sent back to their home clinics, with longer waiting times. Should county councils that sign agreements with independent contractors not demand responsibility when it comes to dealing with complications?

Follow-up: the majority of the most highly productive units in the free care choice system are not linked to the register follow-up routines. How are these patients followed up? What happens to these patients in the long term – where should they turn with problems now that some of the producers from 2002 and 2003 have stopped performing THR?

Local quality programmes: orthopaedic care is increasingly taking the form of an itinerant consultant from external agencies without any administrative links to the actual workplace. This reduces the potential and incentive to influence activities, their content and quality. The continuity that is absolutely vital is lost when the opportunity to see and learn from one's own mistakes disappears, with reduced motivation and involvement in quality programmes as a whole.

Criticism has been levelled at this investigation, as we analysed the entire group and did not point to the results at individual clinics. As the number of complications is so low, there is an obvious risk of misinterpretation as a result of random variation and the group should be followed up over a long period. Most short-term complications in the form of deep infections and re-operations as a result of recurring dislocations should have been dealt with after two to four years of follow-up and the re-operation frequency should therefore be expected to level out after a few years in the studied cohorts. The final quality assessment cannot be made until several years have passed, as the number of revisions due to aseptic loosening will increase as the observation period continues.

This year's comparison

In this year's continued analysis of the above-mentioned groups, only the re-operation frequency (all open additional surgery, not just revisions) and the Kaplan-Meier analysis with revisions after extractions as the definition of failure have been included. No new patient questionnaire focusing on patient-related outcome has been distributed. The follow-up ended on 31 December 2005. The average follow-up period was therefore 36 months (24-48). The follow-up period is still short and primarily reflects complications such as deep infection and revision due to recurring dislocations.

Re-operations were performed on 231 of 14,785 (1.6%) patients undergoing their primary operation within their

Reason	Operated in home county (all over Sweden) (n=14,785)		Free choice (n=1,964)	
	Number	Share (%)	Number	Share (%)
Aseptic loosening	30	0.2	5	0.3
Deep infection	71	0.5	16	0.8
Fracture	21	0.1	1	0.1
Implant fracture	0	0.0	1	0.1
Dislocation	73	0.5	9	0.5
Technical error	11	0.1	3	0.2
Pain only	4	0.0	0	0.0
Miscellaneous	21	0.1	2	0.1
Total	231	1.6	37	1.9

Table 1. Reasons for reoperation. Statistical analysis of the percentage of different reasons revealed no significant difference between the two groups.

Reason	Operated in the WR (n=2,008)		Free choice (n=1,964)	
	Number	Share (%)	Number	Share (%)
Aseptic loosening	5	0.2	5	0.3
Deep infection	6	0.3	16	0.8*
Fracture	0	0.0	1	0.1
Implant fracture	0	0.0	1	0.1
Dislocation	4	0.2	9	0.5
Technical error	3	0.1	3	0.2
Pain only	1	0.0	0	0.0
Miscellaneous	2	0.1	2	0.1
Total	21	1.0	37	1.9

*Table 2. Reasons for reoperation. Statistical analysis of the percentage of different reasons revealed no significant difference between the two groups, except *infection as reason for reoperation (p=0.03, Fischer's Exact Test).*

home county and 37 of 1,964 (1.9%) patients undergoing their primary operation outside their home county (p = 0.29, Fisher's exact test). The number of revisions on 31 December 2005 was 178 of 14,785 (1.2%) and 30 of 1,964 (1.5%) respectively. Implant survival after four years was 98.5 ± 0.2% for the within-county group and 98.0 ± 0.6% for the free flow (Kaplan-Meier analysis, p = 0.2, Log Rank test).

In the "Starting afresh" project (see the section on this topic), a similar analysis was conducted on patients undergoing surgery in the western region during the same period and with the same inclusion criteria as the nationwide study. The reason for conducting this analysis was that, during the study period 2002-2003, the WR was the largest "purchaser" of operations involving hip implants outside its own region – 32% of the flow during the years in question.

The number of patients with the given criteria, who were operated on in the WR, totalled 2,008. The analysis was conducted in 1 December 2005 and the difference in the re-operation frequency compared with the free flow was statistically significant – 14 versus 31 (p = 0.01, Fisher's exact test).

We have conducted an analysis with 31 December 2005 as the final date. The reason for this is that this is a fairer date, as there is some delay in the reporting of re-operations to the register. For results, see the following table. The re-operation frequencies have levelled out to some degree in this new analysis, but they still differ to a statistically significant degree – 21 versus 37 (p = 0.03, Fisher's exact test). We also found a significant difference when it came to deep infection as the cause of re-operations (see Table 2).

Discussion

This year's updated analysis has not changed the results to any marked degree. We are not able to demonstrate any statistically significant difference when the national results are compared with the "free flow" in terms of re-operation frequency and implant survival. In this year's analysis, we were unable to capture patient-related outcome. It should, however, be remembered that the "free flow" patients should have a lower risk of complications than other patients, as this group has a statistically proven lower frequency of co-morbidity.

For many years, the Western Region has had the lowest procedure frequency per 100,000 inhabitants in Sweden. This was the incentive for the separate analysis of the WR compared with the "free flow". We are not able to explain why the difference in this comparison is statistically significant, but this could perhaps initiate an additional in-depth analysis of the material. The result has generated a greater effort within the WR to attempt to increase the "domestic" production of THRs.

As has already been mentioned, the analysed cohorts will be followed up for several years in order to detect any long-term differences in quality. Just like last year, the register management team must unfortunately complain about the fact that the largest players, when it comes to patients undergoing surgery outside their home county, are still not linked to the standardised register follow-up routine. This can naturally impact the opportunity to follow the "free-flow" patients in the future using X-rays and patient-related outcome. Last year's patient questionnaire (which replaced the follow-up control) for the patients in question was initiated and funded by the register.

We feel that quality control of this kind should be included when agreements are signed with players in the free choice of care system or the flow that is dependent on demands to comply with the care guarantee.

Notes

Regions

In Sweden, approximately 125 primary hip arthroplasties per 100,000 inhabitants were performed during the period 1992-2005. The northern and south-eastern regions performed the most operations and the western region and the Stockholm & Gotland region performed the fewest, after adjustments for the number of inhabitants. As different from last year, an increase was seen in both the Stockholm & Gotland region and the west region (not equal to the Western Region, which is a specified county council), with 275 and 300 operations respectively. However, in 2005, both these regions and the west region in particular were clearly under the national average. The number of procedures also increased in the south-eastern region, while the northern and southern regions report insignificant changes. In the Uppsala-Örebro region, the number of procedures declined by just over 200 operations, but the figure here is still above the national average. As the age distribution and probably also the distribution of diagnoses varies between the regions, some variation in the number of primary hip arthroplasties can be expected.

For all six regions, the 15 most common implants during the period 1979-2000 and then every year up to 2005 are reported. In addition, the number of primary operations and the procedure frequency are illustrated, in relation to the national annual average since 1992. The number of primary operations in the region and the revisions they have caused are shown in the form of bar charts. The total revision burden (RB) for 1979-2005 and 1992-2005 is also shown separately for women and men during the latter period. During the latter period, the RB was highest in the Stockholm & Gotland region (11.1%), followed by Uppsala-Örebro and the southern region (10.9%), the west region (10.7%), the south-eastern region (10%) and the northern region (9%). These data reflect to some extent the quality of the operations that were performed in the region, but the percentages are also influenced by the number of primary arthroplasties. The regions that need and at the same time have the potential to perform a large number of primary arthroplasties automatically have a lower relative number of revisions. Other factors, such as variations in case-mix (percentage of high-risk patients) between the regions and the choice of primary implant will also affect the RB. The RB provides information about the level of difficulty and the consumption of resources in the operations that are performed. It also provides some indication of the quality of the operations that are performed, but it says nothing about the specific causes of a revision. The two survival curves show revisions regardless of cause and diagnosis and revision due to aseptic loosening in conjunction with primary osteoarthritis.

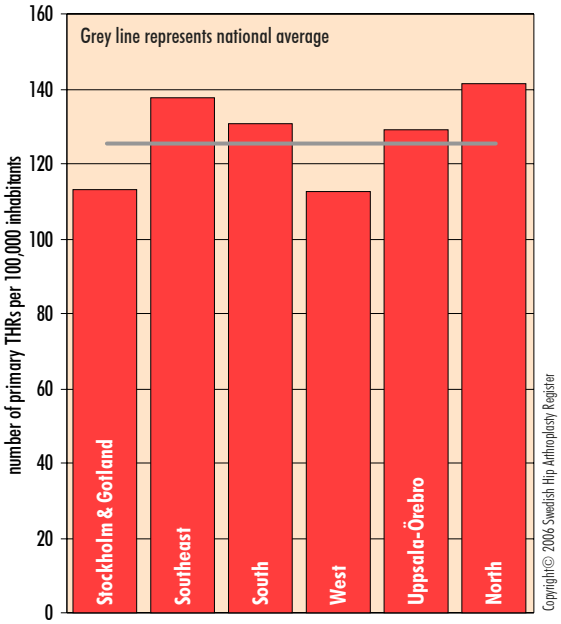
When it comes to the choice of fixation, regional differences caused by the fact that some regions are responsible for development work in the field of prosthetics and therefore use more uncemented, hybrid or reversed hybrid techniques can be seen. It should be noted that the information listed in the tables takes some account of historical data.

In 2005, the percentage of fully cemented implants varied between 76.2% (Stockholm & Gotland region) and 93.6% (northern region). Since 2004, the percentage of fully cemented fixation has declined in all the regions, apart from the northern region. The percentage of fully uncemented fixation increased slowly by up to around 3.5%. In none of the regions did the percentage of fully uncemented fixation exceed 9.6% (Uppsala-Örebro and west regions). When it comes to hybrid implants, the picture is more mixed. In three regions, there has been a slight increase, while a reduction of up to 1.7% in the total number of hip implants has been seen in three regions. This has taken place in the west region, where most hybrid implants are still installed, both in absolute figures and as a relative percentage of the total number (7.0%). The percentage of reversed hybrids is also increasing in all the regions apart from the northern region, where it is unchanged (2.4%). In the west region, the absolute and relative number has more than doubled to 5.1%. In spite of this, by far the largest number of reversed hybrid operations are performed in the Stockholm & Gotland region (13.3%). The observed changes can be partly explained by ongoing studies, but they also correspond to shifts in indication in routine activities. It is important that these changes are monitored and that they are based on evidence from each patient group, while taking account of the cost-benefit perspective and the risk of technique-related complications when changing implants and fixation principles.

The regional differences that can be seen are not simply a reflection of demographic factors. They also reflect implant choice and probably also variables related to surgical techniques. We hope that reporting these data, the individual clinic reports and, whenever appropriate, data from follow-up programmes will help the individual clinics and regions in their development and quality programmes.

Average Frequency of Procedure

all primary THRs 1992-2005



Region: Stockholm & Gotland

15 Most Common Implants

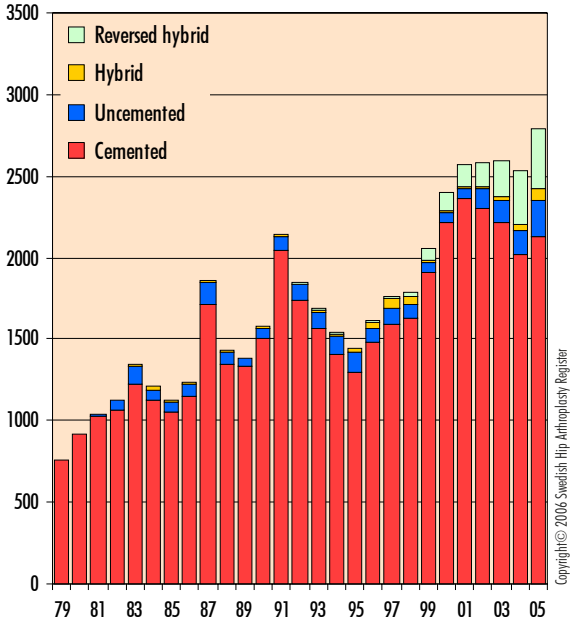
most used during the past 10 years

Cup (Stem)	1979-2000	2001	2002	2003	2004	2005	Total	Share [1)]
Charnley (Charnley)	20,642	996	629	153	71	6	22,497	31.6%
Charnley Elite (Exeter Polished)	589	456	706	772	574	515	3,612	15.8%
Reflection (Spectron EF Primary)	204	147	190	387	361	348	1,637	7.2%
Charnley (Exeter Polished)	115	23	86	188	285	325	1,022	4.5%
Biomet Müller (CPT Steel)	389	214	211	133	1	0	948	4.2%
Weber All-poly cup (Straight-stem standard)	123	99	115	137	195	164	833	3.7%
Lubinus All-poly (Lubinus SP II)	539	135	137	82	77	61	1,031	3.4%
Charnley Elite (ABG uncem.)	58	71	94	127	15	1	366	1.6%
Biomet Müller (CPT CoCr)	0	0	0	61	145	137	343	1.5%
Exeter All-poly (Exeter Polished)	363	1	1	0	0	0	365	1.4%
Contemporary Hooded Duration (Exeter Polished)	0	1	24	69	65	154	313	1.4%
FAL (Lubinus SP II)	0	0	60	71	68	99	298	1.3%
Charnley Elite (Charnley Elite Plus)	281	13	1	0	0	0	295	1.3%
Charnley Elite (Lubinus SP II)	43	27	7	56	65	80	278	1.2%
Charnley (Charnley Elite Plus)	150	68	12	0	0	0	230	1.0%
Others (total 306)	10,064	346	359	371	612	919	12,671	
Total	33,560	2,597	2,632	2,607	2,534	2,809	46,739	

1) Refers to the proportion of the total number of primry THRs performed during the past 10 years.

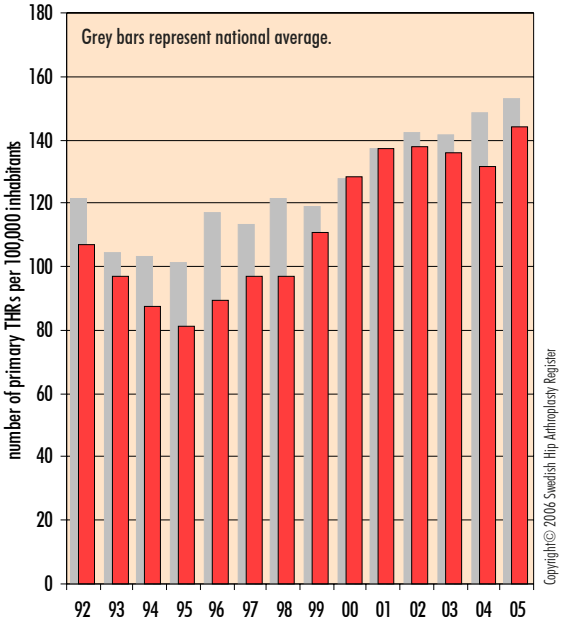
Number of Primary THRs

per type of fixation, 1979-2005



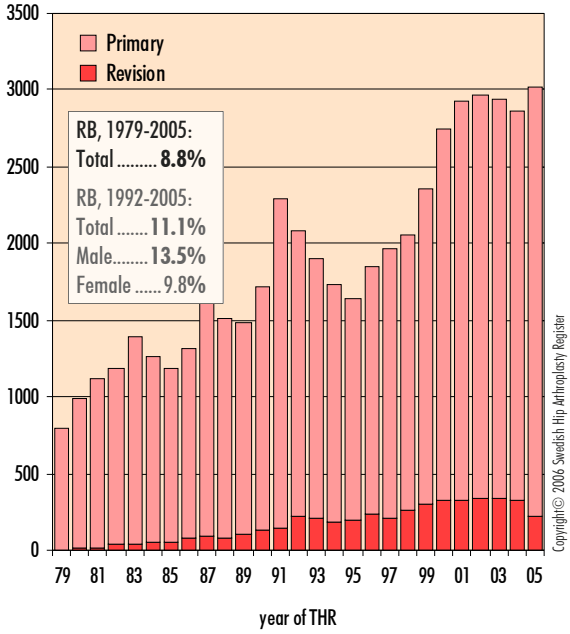
Frequency of Procedure

all primary THRs included



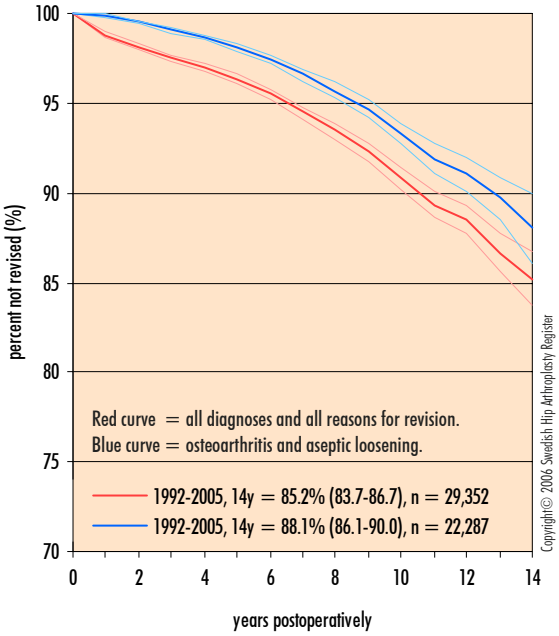
Number of THRs per Year

46,739 primary THRs, 4,513 revisions, 1979-2005



Implantat Survival

1992-2005



Number of Primary THRs per Diagnosis and Year

Diagnosis	1992-2000	2001	2002	2003	2004	2005	Total	Share
Primary osteoarthritis	11,622	2,051	2,144	2,117	2,023	2,330	22,287	75.9%
Fracture	1,945	286	263	265	308	293	3,360	11.4%
Inflammatory arthritis	657	65	46	55	57	43	923	3.1%
Idiopathic femoral head necrosis	496	82	74	64	62	77	855	2.9%
Childhood disease	177	83	85	79	60	51	535	1.8%
Secondary osteoarthritis	152	0	1	3	2	0	158	0.5%
Tumor	74	22	15	12	11	9	143	0.5%
Secondary arthritis after trauma	43	8	4	12	11	6	84	0.3%
(missing)	1,007	0	0	0	0	0	1 007	3.4%
Total	16,173	2,597	2,632	2,607	2,534	2,809	29,352	100%

Mean Age per Gender and Year

Gender	1992-2000	2001	2002	2003	2004	2005	Total
Male	67.8	66.7	67.5	66.3	65.9	66.1	67.2
Female	70.7	70.1	69.9	69.8	69.9	69.6	70.3
Total	69.7	68.9	69.0	68.5	68.3	68.2	69.2

Region: South-east

15 Most Common Implants

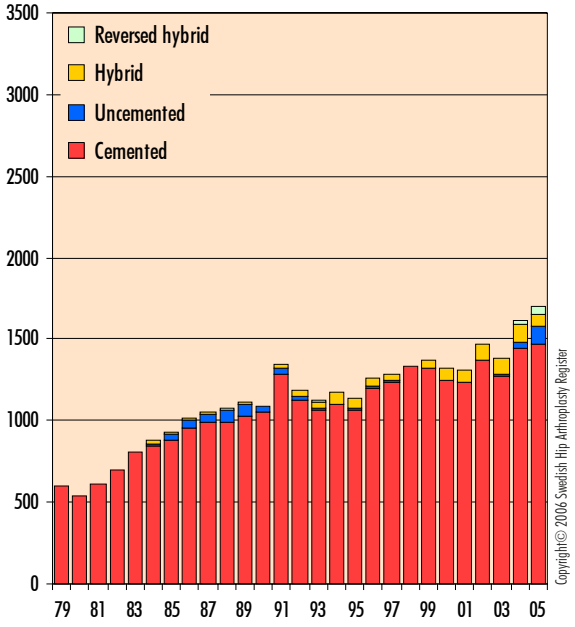
most used during the past 10 years

Cup (Stem)	1979-2000	2001	2002	2003	2004	2005	Total	Share [1)]
Lubinus All-poly (Lubinus SP II)	7,525	744	827	794	1,180	1,336	12,406	61.8%
FAL (Lubinus SP II)	230	283	315	290	160	66	1 344	9.5%
Exeter Duration (Exeter Polished)	292	140	107	16	1	1	557	4.0%
Exeter All-poly (Exeter Polished)	946	1	2	0	0	0	949	3.9%
SHP (Lubinus SP II)	557	0	5	1	3	3	569	3.4%
Charnley Elite (Exeter Polished)	203	24	27	20	28	26	328	2.3%
Contemporary Hooded Duration (Exeter Polished)	0	6	67	134	41	12	260	1.8%
OPTICUP (Lubinus SP II)	231	0	0	0	0	0	231	1.6%
Charnley Elite (Lubinus SP II)	208	11	16	7	3	5	250	1.4%
Trilogy HA (Lubinus SP II)	31	29	17	40	42	37	196	1.4%
Lubinus All-poly (Lubinus IP)	3,296	0	0	0	0	0	3,296	0.8%
Biomex HA (Lubinus SP II)	19	20	33	30	3	0	105	0.7%
Reflection HA (Lubinus SP II)	25	12	19	15	23	10	104	0.7%
Mallory-Head uncem. (Lubinus SP II)	81	4	6	2	3	2	98	0.6%
Contemporary (Lubinus SP II)	68	0	0	0	0	0	68	0.4%
Others (total 158)	9,280	38	27	40	128	207	9,720	
Total	22,992	1,312	1,468	1,389	1,615	1,705	30,481	

1) Refers to the proportion of the total number of primry THRs performed during the past 10 years.

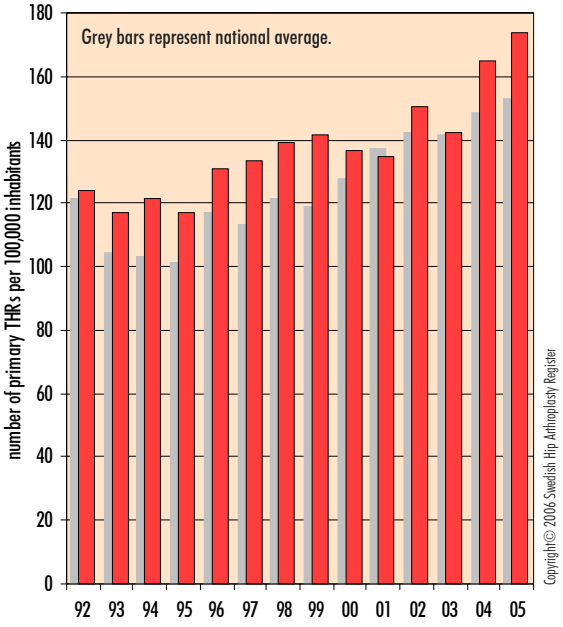
Number of Primary THRs

per type of fixation, 1979-2005



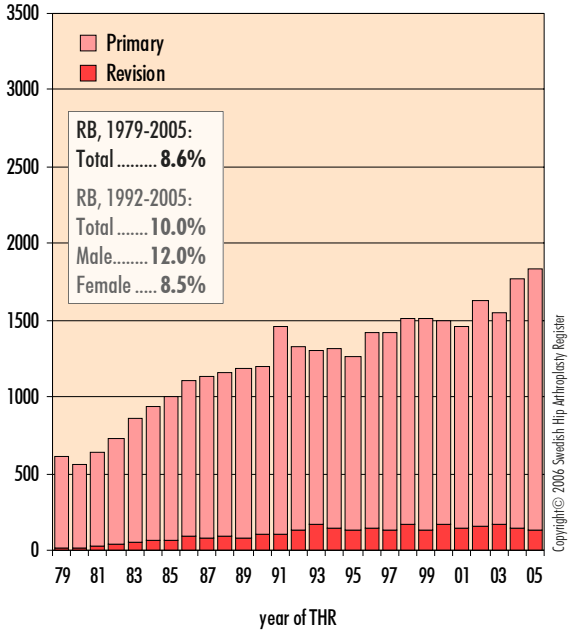
Frequency of Procedure

all primary THRs included



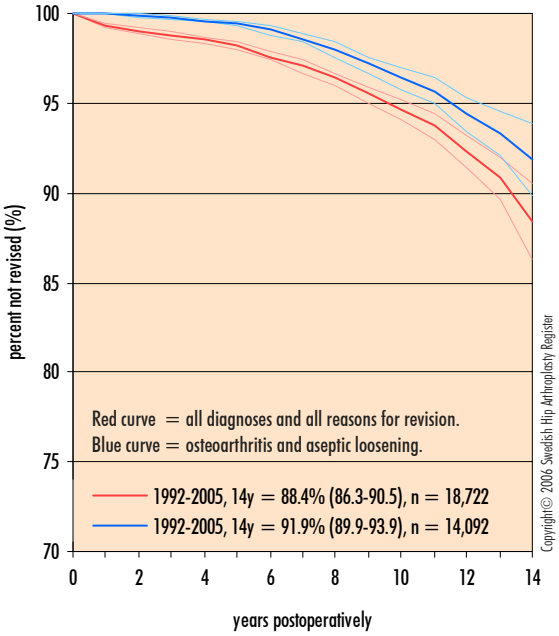
Number of THRs per Year

30,481 primary THRs, 2,871 revisions, 1979-2005



Implant Survival

1992-2005



Number of Primary THRs per Diagnosis and Year

Diagnosis	1992-2000	2001	2002	2003	2004	2005	Total	Share
Primary osteoarthritis	8,091	1,032	1,152	1,101	1,302	1,414	14,092	75.3%
Fracture	1,564	171	206	183	221	197	2,542	13.6%
Inflammatory arthritis	649	46	38	42	27	22	824	4.4%
Idiopathic femoral head necrosis	368	35	31	39	30	35	538	2.9%
Secondary osteoarthritis	271	0	0	0	0	0	271	1.4%
Childhood disease	112	23	30	12	23	26	226	1.2%
Tumor	20	4	11	10	10	9	64	0.3%
Secondary arthritis after trauma	34	1	0	2	2	2	41	0.2%
(missing)	124	0	0	0	0	0	124	0.7%
Total	11,233	1,312	1,468	1,389	1,615	1,705	18,722	100%

Mean Age per Gender and Year

Gender	1992-2000	2001	2002	2003	2004	2005	Total
Male	69.0	68.0	68.0	68.3	68.3	68.7	68.7
Female	71.5	70.8	71.0	71.0	70.9	70.4	71.2
Total	70.5	69.6	69.7	69.9	69.9	69.7	70.2

Region: South

15 Most Common Implants

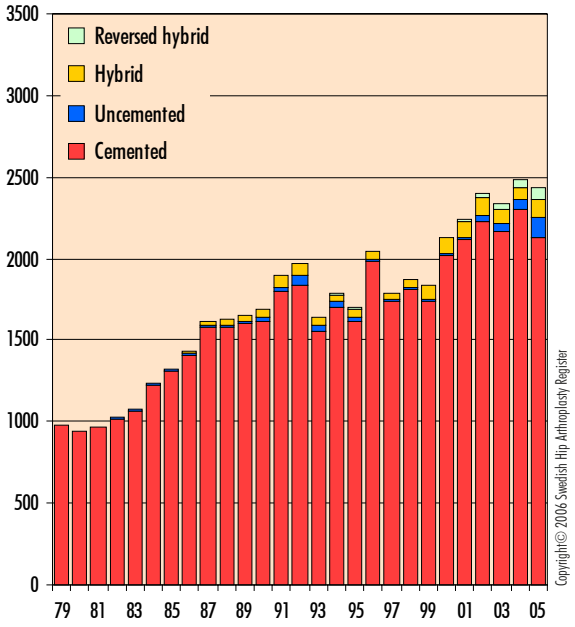
most used during the past 10 years

Cup (Stem)	1979-2000	2001	2002	2003	2004	2005	Total	Share [1)]
Lubinus All-poly (Lubinus SP II)	4,430	627	701	580	697	607	7,642	25.1%
Exeter Duration (Exeter Polished)	946	775	931	963	979	736	5,330	24.6%
OPTICUP (Scan Hip II Collar)	1,180	365	279	125	10	0	1,959	9.0%
Exeter All-poly (Exeter Polished)	2,677	9	13	6	10	2	2,717	8.5%
Charnley (Charnley Elite Plus)	920	31	0	0	0	0	951	4.3%
Charnley (Charnley)	6,098	20	9	5	3	0	6,135	3.6%
Charnley Elite (Exeter Polished)	5	86	99	158	192	220	760	3.5%
Scan Hip Cup (Scan Hip Collar)	5,356	0	0	0	0	0	5,356	2.7%
Trilogy HA (Lubinus SP II)	194	70	53	40	34	28	419	1.9%
Contemporary Hooded Duration (Exeter Polished)	1	0	8	87	120	194	410	1.9%
Weber All-poly cup (MS30 Polished)	10	4	28	114	150	16	322	1.5%
Charnley Elite (Charnley Elite Plus)	275	44	0	0	0	0	319	1.4%
Charnley (Exeter Polished)	10	65	51	44	43	50	263	1.2%
ZCA (MS30 Polished)	0	0	0	0	7	224	231	1.1%
Scan Hip Cup (Scan Hip II Collar)	186	0	0	0	0	0	186	0.9%
Others (total 245)	12,145	138	228	220	246	358	13,335	
Total	34,433	2,234	2,400	2,342	2,491	2,435	46,335	

1) Refers to the proportion of the total number of primry THRs performed during the past 10 years.

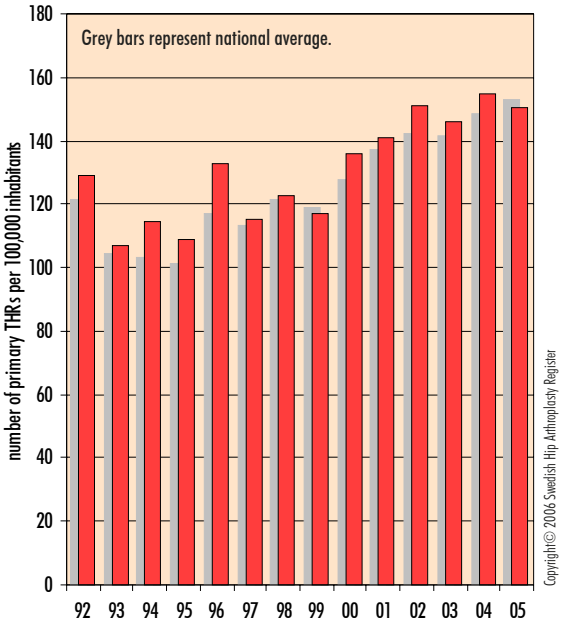
Number of Primary THRs

per type of fixation, 1979-2005



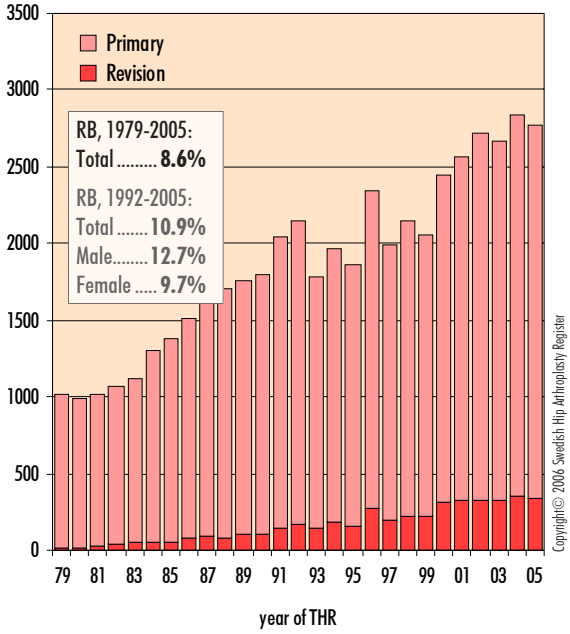
Frequency of Procedure

all primary THRs included



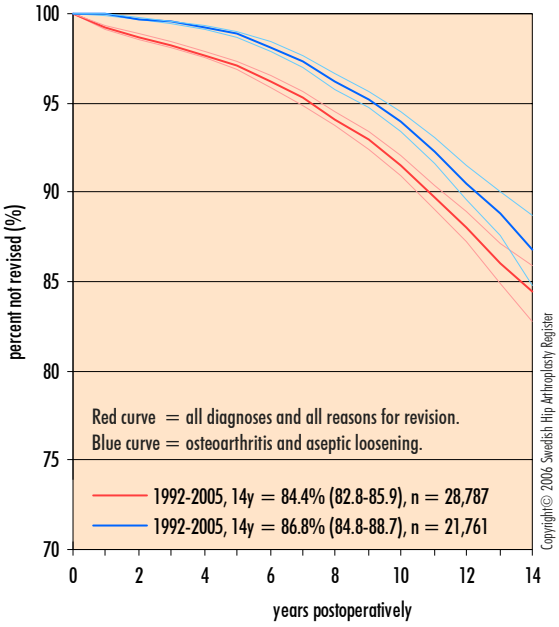
Number of THRs per Year

46,335 primary THRs, 4,362 revisions, 1979-2005



Implant Survival

1992-2005



Number of Primary THRs per Diagnosis and Year

Diagnosis	1992-2000	2001	2002	2003	2004	2005	Total	Share
Primary osteoarthritis	12,062	1,766	1,958	1,857	2,053	2,065	21,761	75.6%
Fracture	2,260	233	224	245	225	178	3,365	11.7%
Inflammatory arthritis	1,038	106	80	83	65	68	1,440	5.0%
Idiopathtic femoral head necrosis	536	69	77	83	79	61	905	3.1%
Childhood disease	218	44	48	47	44	39	440	1.5%
Tumor	110	13	9	17	20	17	186	0.6%
Secondary osteoarthritis	143	0	0	0	0	4	147	0.5%
Secondary arthritis after trauma	29	3	4	10	5	3	54	0.2%
(missing)	489	0	0	0	0	0	489	1.7%
Total	16,885	2,234	2,400	2,342	2,491	2,435	28,787	100%

Mean Age per Gender and Year

Gender	1992-2000	2001	2002	2003	2004	2005	Total
Male	68.2	68.2	66.8	67.7	66.9	66.6	67.8
Female	70.8	69.9	70.0	69.9	70.3	69.6	70.4
Total	69.8	69.2	68.7	69.0	68.9	68.3	69.4

Region: West

15 Most Common Implants

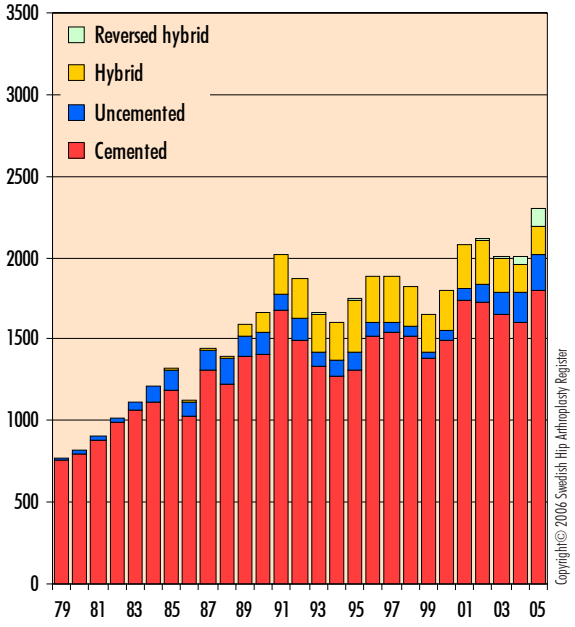
most used during the 10 years

Cup (Stem)	1979-2000	2001	2002	2003	2004	2005	Total	Share [1)]
Lubinus All-poly (Lubinus SP II)	5,290	1,157	1,184	1,156	1,113	1,365	11,265	47.0%
Reflection (Spectron EF Primary)	1,714	442	400	382	356	335	3,629	18.5%
Trilogy HA (Spectron EF Primary)	405	176	173	127	107	80	1,068	5.5%
Biomet Müller (RX90-S)	1,355	7	0	0	0	0	1,362	5.4%
OPTICUP (Optima)	449	0	0	0	0	0	449	1.6%
Charnley (Charnley)	4,672	0	0	0	0	0	4,672	1.6%
Contemporary (Exeter Polished)	357	2	2	1	0	0	362	1.4%
Trilogy HA (CLS Spotorno)	3	4	15	22	65	124	233	1.2%
Charnley Elite (Spectron EF Primary)	76	36	20	36	37	27	232	1.2%
ZCA (Stanmore mod.)	14	16	56	53	55	26	220	1.1%
ABG II HA (Lubinus SP II)	120	21	10	2	3	0	156	0.8%
ABG II HA (ABG uncem.)	48	29	42	12	9	8	148	0.8%
Trilogy HA (Versys stem)	1	10	23	53	43	8	138	0.7%
ABG HA (Lubinus SP II)	271	0	0	0	0	0	271	0.7%
Duralock (uncem.) (Spectron EF Primary)	114	0	0	0	0	0	114	0.6%
Others (total 305)	17,569	183	190	158	217	332	18,649	
Total	32,458	2,083	2,115	2,002	2,005	2,305	42,968	

1) Refers to the proportion of the total number of primry THRs performed during the past 10 years.

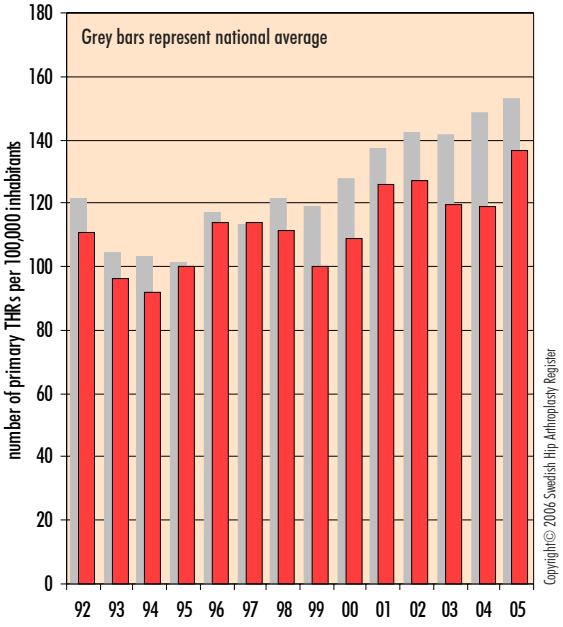
Number of Primary THRs

per type of fixation, 1979-2005



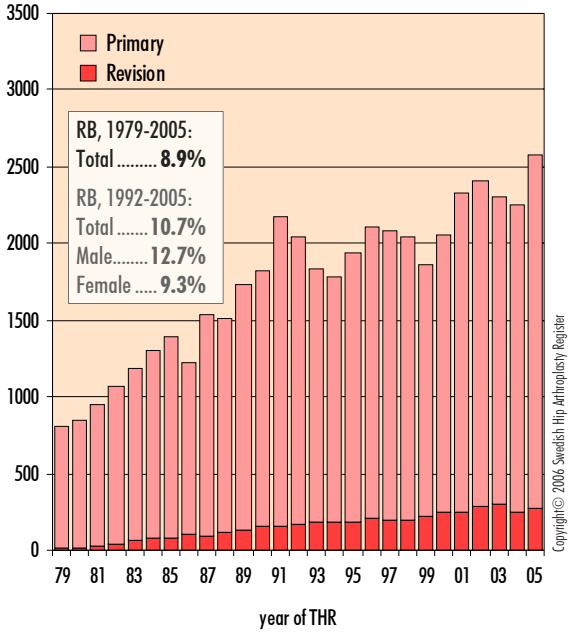
Frequency of Procedure

all primary THRs included



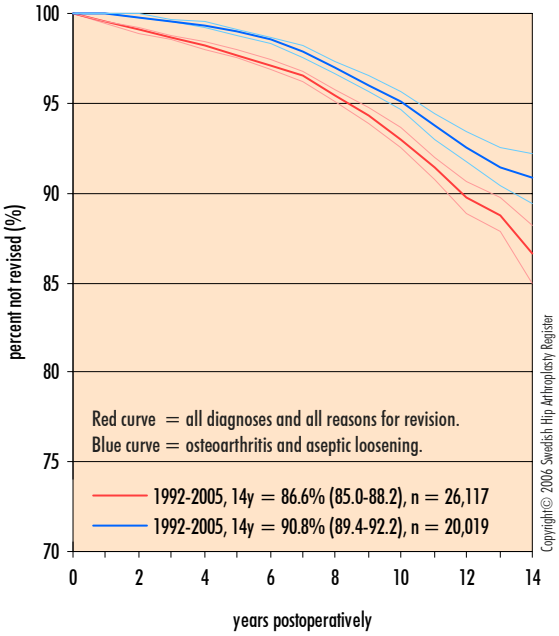
Number of THRs per Year

42,968 primary THRs, 4,198 revisioner, 1992-2005



Implant Survival

1992-2005



Number of Primary THRs per Diagnosis and Year

Diagnosis	1992-2000	2001	2002	2003	2004	2005	Total	Share
Primary osteoarthritis	11,747	1,609	1,646	1,549	1,570	1,898	20,019	76.7%
Fracture	1,680	323	287	296	242	215	3,043	11.7%
Inflammatory arthritis	792	61	74	65	76	75	1,143	4.4%
Idiopathic femoral head necrosis	324	39	44	44	50	44	545	2.1%
Childhood disease	303	37	51	33	49	59	532	2.0%
Secondary osteoarthritis	269	0	0	0	0	0	269	1.0%
Tumor	47	14	11	9	12	12	105	0.4%
Secondary arthritis after trauma	27	0	2	6	6	2	43	0.2%
(missing)	418	0	0	0	0	0	418	1.6%
Total	15,607	2,083	2,115	2,002	2,005	2,305	26,117	100%

Mean Age per Gender and Year

Gender	1992-2000	2001	2002	2003	2004	2005	Total
Male	67.7	67.3	67.2	68.1	66.9	66.2	67.5
Female	70.0	70.8	70.4	70.2	69.6	69.2	70.0
Total	69.1	69.4	69.1	69.4	68.5	68.0	69.0

Region: Uppsala-Örebro

15 Most Common Implants

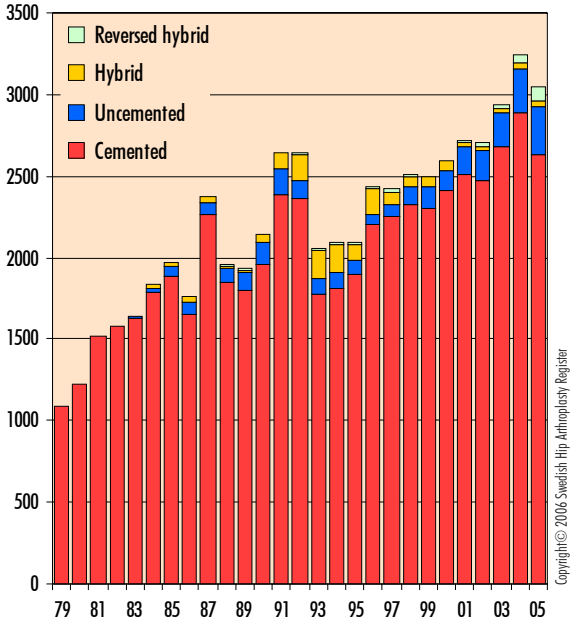
most used during the past 10 years

Cup (Stem)	1979-2000	2001	2002	2003	2004	2005	Total	Share [1)]
Lubinus All-poly (Lubinus SP II)	5,185	681	764	1,034	1,139	1,058	9,861	28.4%
Charnley (Charnley)	14,862	583	287	122	7	1	15,862	14.4%
Exeter Duration (Exeter Polished)	567	335	304	212	161	155	1,734	6.4%
FAL (Lubinus SP II)	0	23	295	451	473	413	1,655	6.1%
Contemporary Hooded Duration (Exeter Polished)	0	9	177	271	288	209	954	3.5%
Cenator (Cenator)	1,152	0	0	0	0	0	1,152	3.2%
Exeter All-poly (Exeter Polished)	1,316	5	3	0	0	0	1,324	3.1%
Müller All-poly (Müller Straight)	3,959	72	61	60	77	75	4,304	2.9%
Reflection (Spectron EF Primary)	201	85	103	120	154	101	764	2.8%
Charnley Elite (Exeter Polished)	31	34	80	110	201	214	670	2.5%
Cenator (Exeter Polished)	462	194	3	1	0	0	660	2.4%
Exeter Duration (Lubinus SP II)	99	45	70	110	113	119	556	2.0%
Charnley Elite (Charnley Elite Plus)	448	94	9	0	0	0	551	2.0%
Stanmore (Stanmore modular)	71	212	186	18	0	0	487	1.8%
Charnley (Exeter Polished)	424	14	22	46	103	142	751	1.6%
Others (total 323)	16,320	329	343	390	533	560	18,475	
Total	45,097	2,715	2,707	2,945	3,249	3,047	59,760	

1) Refers to the proportion of the total number of primry THRs performed during the past 10 years.

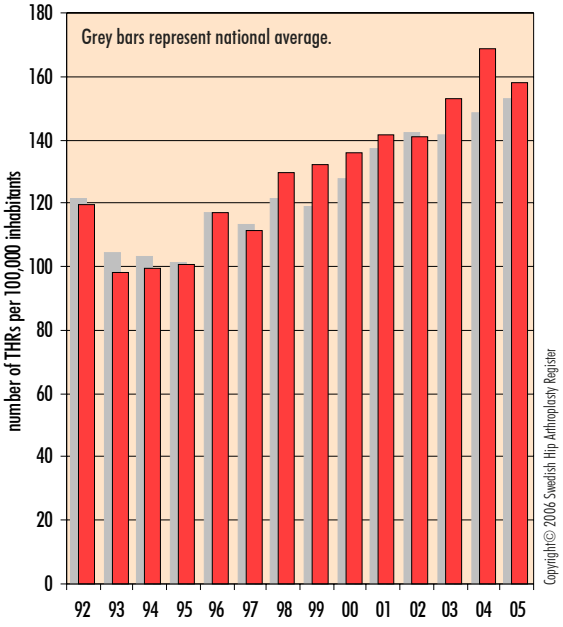
Number of Primary THRs

per type of fixation, 1979-2005



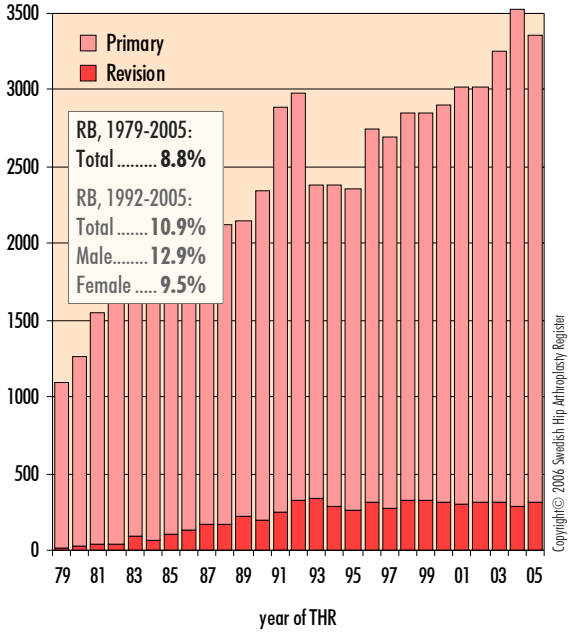
Frequency of Procedure

all primary THRs included



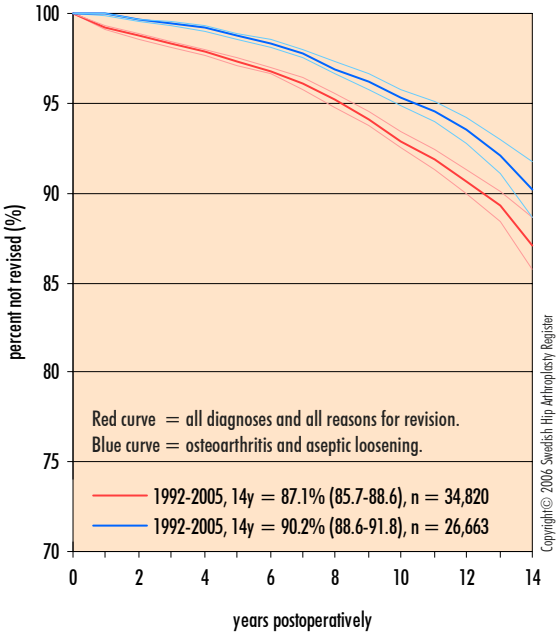
Number of THRs per Year

59,760 primary THRs, 5,769 revisions, 1979-2005



Implant Survival

1992-2005



Number of Primary THRs per Diagnosis and Year

Diagnosis	1992-2000	2001	2002	2003	2004	2005	Total	Share
Primary osteoarthritis	15,092	2,073	2,127	2,303	2,607	2,461	26,663	76.6%
Fracture	2,272	373	335	370	337	328	4,015	11.5%
Inflammatory arthritis	1,183	117	99	100	95	84	1,678	4.8%
Idiopathic femoral head necrosis	647	91	78	83	92	84	1,075	3.1%
Childhood disease	338	45	49	69	101	66	668	1.9%
Secondary osteoarthritis	193	0	0	0	0	0	193	0.6%
Tumor	83	12	16	13	14	21	159	0.5%
Secondary arthritis after trauma	53	4	3	7	3	3	73	0.2%
(missing)	296	0	0	0	0	0	296	0.9%
Total	20,157	2,715	2,707	2,945	3,249	3,047	34,820	100%

Mean Age per Gender and Year

Gender	1992-2000	2001	2002	2003	2004	2005	Total
Male	68.0	67.3	67.6	68.0	66.9	67.5	67.8
Female	70.4	70.8	70.8	70.3	70.0	70.5	70.4
Total	69.4	69.4	69.5	69.4	68.7	69.3	69.3

Region: North

15 Most Common Implants

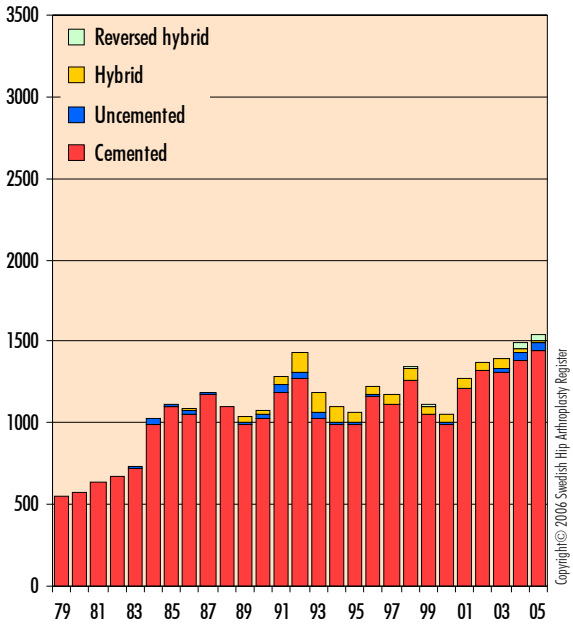
most used during the past 10 years

Cup (Stem)	1979-2000	2001	2002	2003	2004	2005	Total	Share [1)]
Lubinus All-poly (Lubinus SP II)	8,952	869	974	1,062	1,190	1,218	14,265	67.8%
Exeter Duration (Exeter Polished)	385	249	196	225	187	228	1,470	11.3%
Exeter Plast (Exeter Polished)	1,123	8	4	2	0	0	1,137	5.7%
Scan Hip Cup (Optima)	422	1	0	0	0	0	423	2.2%
Charnley (Charnley)	2,430	1	1	1	0	0	2,433	2.0%
Reflection (Spectron EF Primary)	210	2	0	0	0	0	212	1.6%
FAL (Lubinus SP II)	2	41	140	20	6	1	210	1.6%
Trilogy HA (Lubinus SP II)	24	33	53	61	30	5	206	1.6%
Reflection HA (Spectron EF Primary)	98	0	0	0	0	0	98	0.8%
Reflection HA (Lubinus SP II)	82	0	0	0	0	0	82	0.5%
Scan Hip Cup (Scan Hip Collar)	765	0	0	0	0	0	765	0.5%
Exeter Duration (Omnifit)	5	3	0	0	16	10	34	0.3%
Trilogy HA (Omnifit)	0	0	0	0	17	8	25	0.2%
Spectron (Spectron EF Primary)	21	0	0	0	0	0	21	0.2%
OPTICUP (Scan Hip II Collar)	3	18	0	0	0	0	21	0.2%
Others (total 171)	8,389	51	8	30	51	77	8,606	
Total	22,911	1,276	1,376	1,401	1,497	1,547	30,008	

1) Refers to the proportion of the total number of primry THRs performed during the past 10 years.

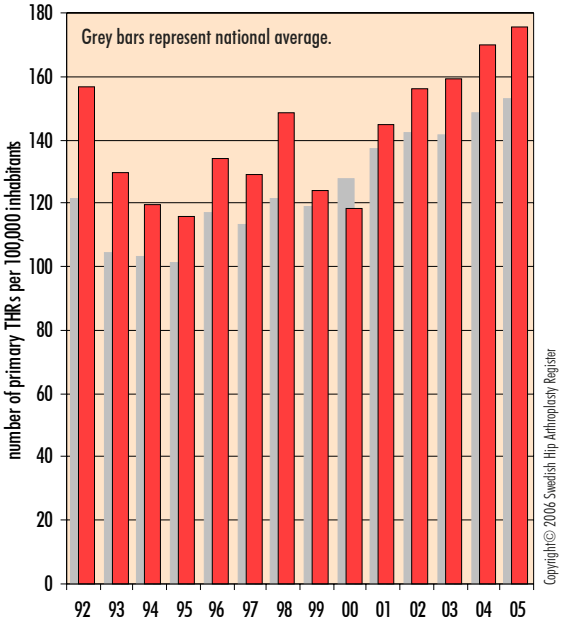
Number of Primary THRs

per type of fixation, 1979-2005



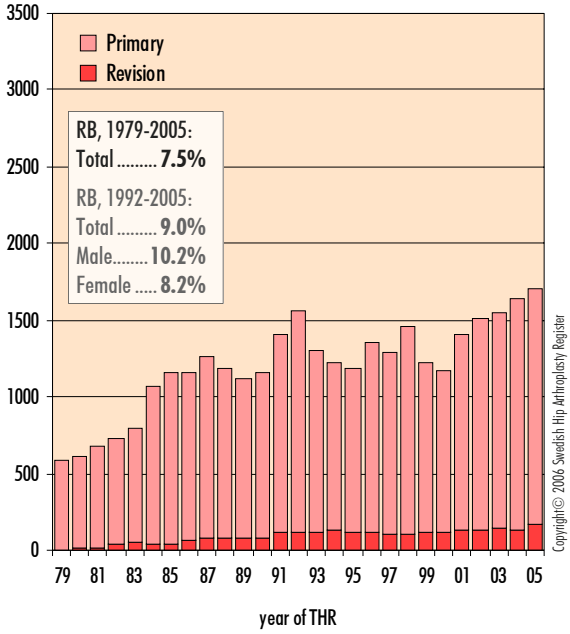
Frequency of Procedure

all primary THRs included



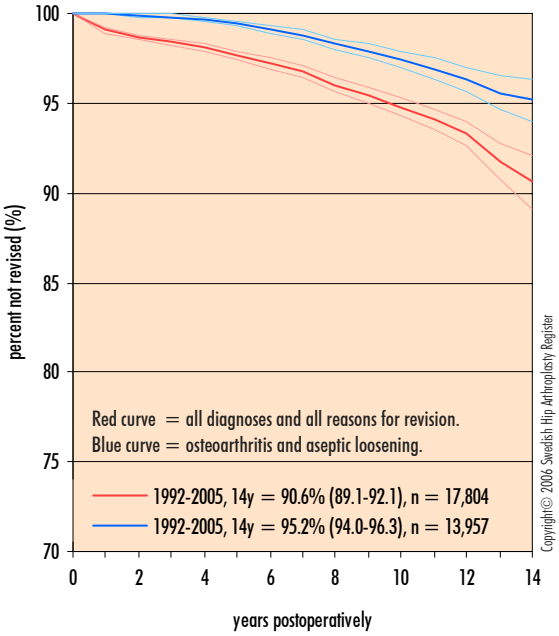
Number of THRs per Year

30,008 primary THRs, 2,450 revisions, 1979-2005



Implant Survival

1992-2005



Number of Primary THRs per Diagnosis and Year

Diagnosis	1992-2000	2001	2002	2003	2004	2005	Total	Share
Primary osteoarthritis	8,008	1,031	1,161	1,188	1,229	1,340	13,957	78.4%
Fracture	916	136	118	114	149	103	1,536	8.6%
Inflammatory arthritis	574	31	37	32	34	31	739	4.2%
Idiopathic femoral head necrosis	345	47	27	30	30	37	516	2.9%
Childhood disease	129	23	26	32	45	27	282	1.6%
Secondary osteoarthritis	267	0	0	0	0	0	267	1.5%
Secondary osteoarthritis after trauma	88	1	0	0	1	0	90	0.5%
Tumor	26	7	7	5	9	9	63	0.4%
(missing)	354	0	0	0	0	0	354	2.0%
Total	10,707	1,276	1,376	1,401	1,497	1,547	17,804	100%

Mean Age per Gender and Year

Gender	1992-2000	2001	2002	2003	2004	2005	Total
Male	67.9	68.4	67.5	67.2	67.3	67.5	67.8
Female	70.0	69.7	69.7	69.4	68.9	69.0	69.7
Total	69.2	69.2	68.7	68.5	68.3	68.4	69.0

National quality indicators

Background

The Swedish government has assigned the following briefs:

- In consultation with the SALAR, the National Board of Health and Welfare is to formulate national quality indicators which will be able to reflect different aspects of quality within health and medical care. These indicators must be clearly defined, reliable, measurable, accepted and possible to register continuously in management systems such as registers and other sources of data.
- Principals are to run systematic quality programmes and present their results in an open, comparable and accessible manner.
- All care providers are to use nationally established quality indicators when following up their activities and must openly present results, quality and costs as part of ongoing improvement programmes.
- Mission: "Open comparisons in 2006 of health service quality and efficiency" is to be reported no later than 30 June 2006.

Implementation

Within the medical areas in which national quality registers have already been established, the National Board of Health and Welfare and the SALAR, in collaboration with the registers, have produced satisfactory indicators, starting in the autumn of 2005. One of the basic prerequisites was that these indicators were to be openly reported. To begin with, a request was also made for indicators for each county council/region to make it possible to present the same indicators at hospital level in the future.

Following discussions with the register management, the following indicators have been selected for THR surgery:

- **Ten-year survival of implants according to traditional Kaplan-Meier statistics.** The definition of failure is the replacement of one or both components or the definitive removal of the implant. All primary diagnoses and all reasons for revisions are included. The results relate to the period 1995 up to and including 2005. This variable must be regarded as "slow", but in the long term it is the most important quality indicator.
- **Short-term complications**, i.e. re-operations (of all kinds) within two years following the primary operation. These complications are to be reported for the last four years. The follow-up period is short and primarily reflects early and serious post-operative complications such as deep infection and revision due to recurring dislocations. This variable should be regarded as a "fast" quality indicator. It should be noted that this report relates to complications that are dealt with surgically (see the section on short-term complications).
- **EQ-5D index – benefits one year after surgery**, i.e. the prospective value seen in the EQ-5D index in the follow-up routine. The government assignment stipulates "that indicators that reflect patient-perceived quality should be included". This patient-related outcome with health benefits (value produced by the EQ-5D index) is an important variable for this patient group which undergo surgery with poor quality of life as the indication for surgery. This variable should also be regarded as a "fast" quality indicator.

Results

When interpreting these results, it is important to take account of the confidence intervals, which are clearly shown in the figure. If the confidence intervals overlap one another, it is obvious that there is no statistically confirmed difference between the stated valued for implant survival. It is, however, important to take account of the percentage of patients with primary osteoarthritis and the percentage of patients in the specified age interval (case-mix).

Ten-year survival. Four county councils/regions have statistically lower 10-year survival than the national average, while seven have better 10-year survival. The county council in the County of Uppsala is totally dominated by activity at Akademiska Hospital. This hospital is largely a regional hospital for northern Sweden and operates on a large number of "risk patients", which can be clearly seen in the table, where it has the lowest percentage of patients with primary osteoarthritis and also the smallest number of patients in the specified standard age interval. Real differences in quality may nonetheless exist and each county council/region should naturally analyse its results in order to initiate an improvement programme. Good explanations will be required from all the representatives of county councils/regions that put in the poorest performances.

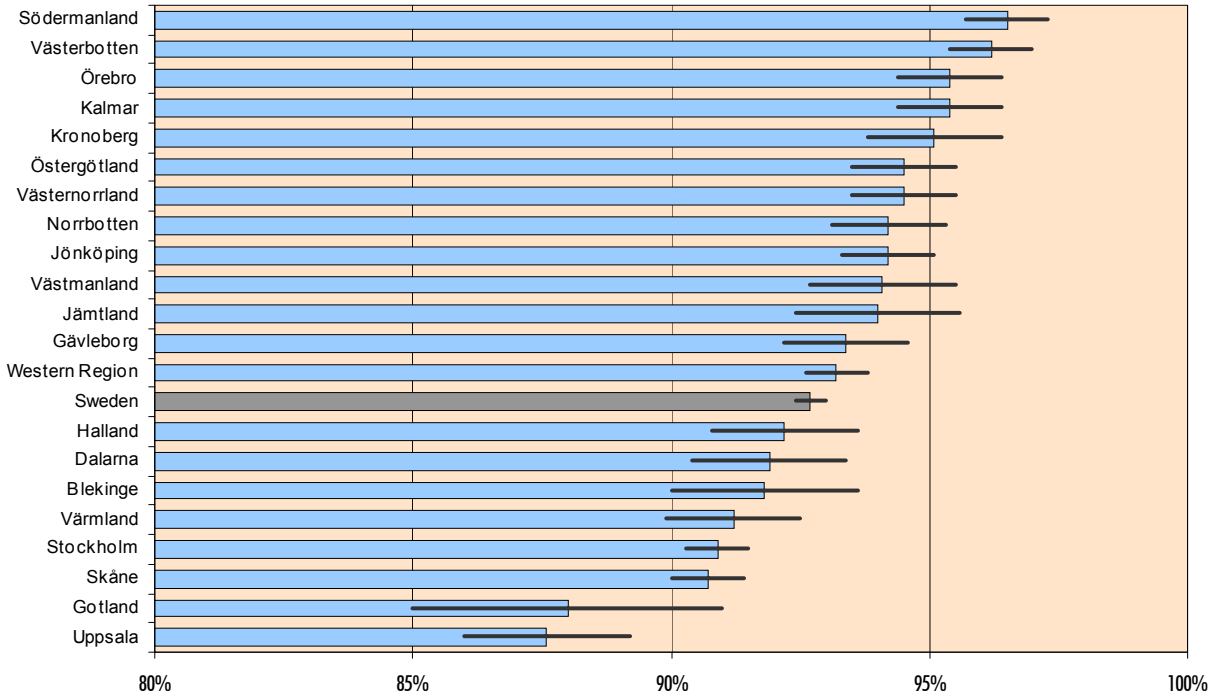
Short-term complications. As has already been stated, the number of complications is low and should be evaluated with care. This quality indicator can really only be assessed over time; i.e. if clear trends can be seen. If so, an in-depth analysis should be initiated to enable a programme of continuous improvement with a review of routines, surgical techniques and possible implant selection.

EQ-5D index benefits. As this part of the register is still in its introductory phase, any attempt at satisfactory comparisons will fail. It is, however, very important that it is reported in order to support the actual introduction. The patient-related outcome, comprising satisfaction, pain relief and health benefits (value produced by the EQ-5D index), is an important variable for this patient group, which undergo surgery with pain and poor quality of life as the specific indication for surgery. If all the producing units participate, we shall have access both to a "fast" quality indicator and to future opportunities to conduct comparative health-economy analyses in which we can calculate the cost effectiveness of the participating units. Being able to calculate the QALY cost for all clinics could provide an interesting future national quality indicator. This could have a decisive impact on the necessary work of prioritisation and allocation.

In order to enhance the quality of reports from the register and thereby improve the values, more resources for both the register and the individual clinics are, however, needed.

Implant Survival after 10 Years per County Council

1992-2005

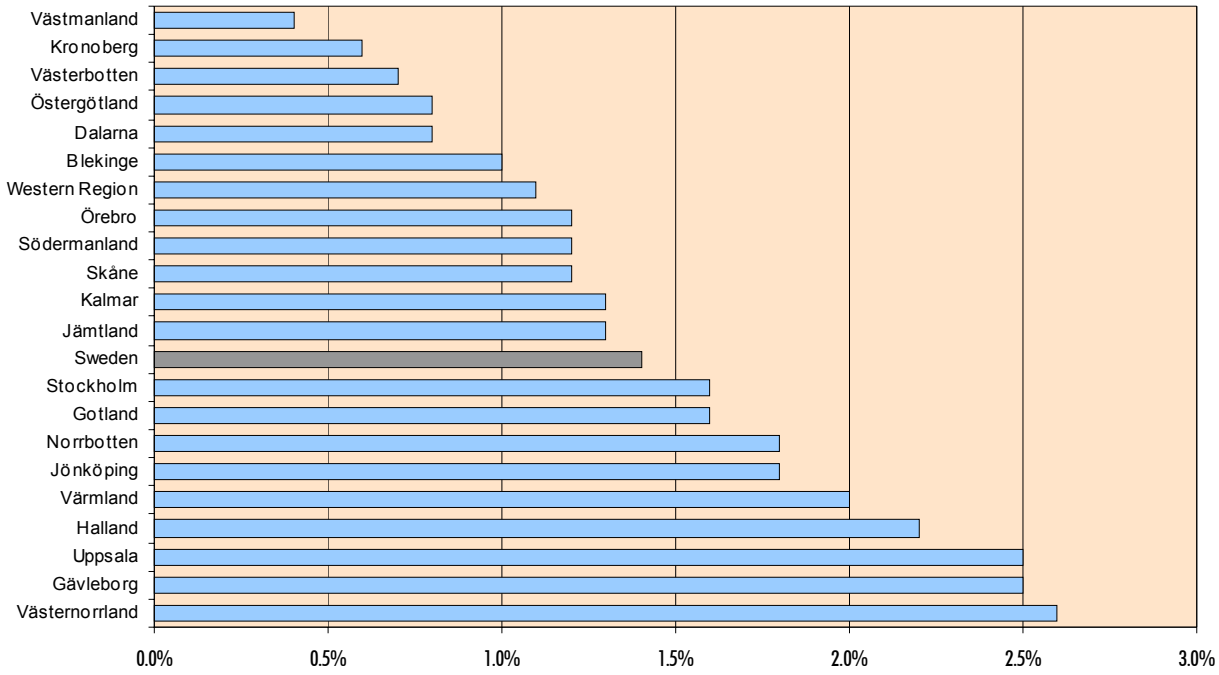


	Number THRs	OA [1]	60-75 years [2]	10-year survival	CI
Södermanland	5,093	75.6%	52.0%	96.5%	±0.8%
Västerbotten	5,090	76.1%	53.4%	96.2%	±0.8%
Örebro	5,220	78.3%	51.1%	95.4%	±1.0%
Kalmar	5,157	73.2%	50.8%	95.4%	±1.0%
Kronoberg	2,882	85.3%	53.9%	95.1%	±1.3%
Östergötland	7,503	70.7%	47.3%	94.5%	±1.0%
Västernorrland	5,342	83.2%	53.6%	94.5%	±1.0%
Norrbotten	5,274	74.6%	53.2%	94.2%	±1.1%
Jönköping	6,062	82.6%	52.6%	94.2%	±0.9%
Västmanland	3,843	80.8%	55.0%	94.1%	±1.4%
Jämtland	2,098	81.0%	52.9%	94.0%	±1.6%
Gävleborg	5,801	75.1%	52.4%	93.4%	±1.2%
Western Region	23,780	75.9%	50.5%	93.2%	±0.6%
Sweden	155,609	76.3%	50.4%	92.7%	±0.3%
Halland	4,738	75.2%	50.2%	92.2%	±1.4%
Dalarna	4,425	84.0%	53.4%	91.9%	±1.5%
Blekinge	2,477	81.7%	48.7%	91.8%	±1.8%
Värmland	5,118	78.4%	54.4%	91.2%	±1.3%
Stockholm	28,235	75.7%	47.6%	90.9%	±0.6%
Skåne	21,027	74.6%	49.3%	90.7%	±0.7%
Gotland	1,053	82.2%	53.6%	88.0%	±3.0%
Uppsala	5,320	66.4%	45.3%	87.6%	±1.6%

[1] Percentage of primary THRs performed due to primary osteoarthritis.
[2] Percentage of primary THRs in the age-group 60-75 years (age at primary operation).

Reoperation within 2 Years per County Council

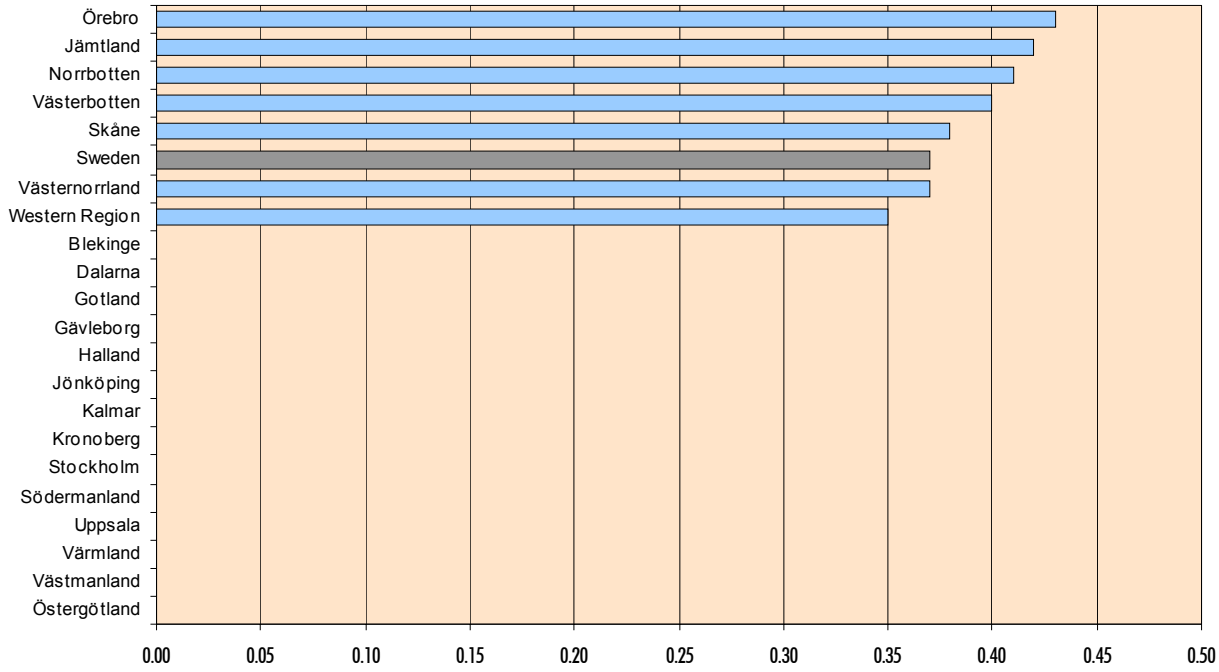
2002-2005



	Primary THRs	— Total—		— Infection —		— Dislocation —		— Loosening —		— Others —	
	Number	Number	%	Number	%	Number	%	Number	%	Number	%
Västmanland	1,268	5	0.4%	0	0.0%	4	0.3%	0	0.0%	2	0.2%
Kronoberg	863	5	0.6%	0	0.0%	2	0.2%	1	0.1%	2	0.2%
Västerbotten	1,684	12	0.7%	2	0.1%	5	0.3%	2	0.1%	7	0.4%
Östergötland	2,428	20	0.8%	4	0.2%	12	0.5%	1	0.0%	4	0.2%
Dalarna	1,558	13	0.8%	3	0.2%	6	0.4%	2	0.1%	2	0.1%
Blekinge	819	8	1.0%	0	0.0%	5	0.6%	2	0.2%	1	0.1%
Western Region	7,669	85	1.1%	26	0.3%	37	0.5%	7	0.1%	31	0.4%
Örebro	1,776	21	1.2%	8	0.5%	8	0.5%	1	0.1%	8	0.5%
Södermanland	1,631	20	1.2%	6	0.4%	7	0.4%	4	0.2%	11	0.7%
Skåne	7,169	88	1.2%	25	0.3%	34	0.5%	10	0.1%	36	0.5%
Kalmar	1,844	24	1.3%	13	0.7%	11	0.6%	0	0.0%	6	0.3%
Jämtland	681	9	1.3%	2	0.3%	3	0.4%	0	0.0%	4	0.6%
Sweden	52,623	763	1.4%	259	0.5%	313	0.6%	69	0.1%	266	0.5%
Stockholm	10,264	169	1.6%	51	0.5%	70	0.7%	25	0.2%	62	0.6%
Gotland	254	4	1.6%	0	0.0%	1	0.4%	1	0.4%	2	0.8%
Norrbotten	1,697	30	1.8%	17	1.0%	9	0.5%	1	0.1%	9	0.5%
Jönköping	1,905	34	1.8%	7	0.4%	19	1.0%	1	0.1%	13	0.7%
Värmland	1,482	29	2.0%	20	1.3%	6	0.4%	2	0.1%	10	0.7%
Halland	1,575	34	2.2%	24	1.5%	7	0.4%	1	0.1%	11	0.7%
Uppsala	2,041	51	2.5%	22	1.1%	15	0.7%	4	0.2%	18	0.9%
Gävleborg	2,192	54	2.5%	13	0.6%	28	1.3%	3	0.1%	13	0.6%
Västernorrland	1,759	46	2.6%	15	0.9%	23	1.3%	1	0.1%	13	0.7%

Patient-related Outcome per County Council

2002-2005



	Share of C-pat. preop.	EQ-5D index preop.	EQ-5D index 1 year	EQ-5D index gained	Comments
Örebro	34%	0.46	0.89	0.43	Karlskoga has not joined yet.
Jämtland	31%	0.35	0.77	0.42	
Norrbotten	45%	0.33	0.74	0.41	
Västerbotten	46%	0.36	0.76	0.40	
Skåne	42%	0.37	0.75	0.38	Hässleholm and Helsingborg have not joined yet.
Sweden	43%	0.38	0.75	0.37	
Västernorrland	43%	0.40	0.77	0.37	
Western Region	43%	0.39	0.74	0.35	The Western Region joined Jan. 1, 2002.
Blekinge	42%	0.35			Joined Sep. 1, 2005 - no 1-year results.
Dalarna					Not joined yet.
Gotland					Not joined yet.
Gävleborg	55%	0.48			No 1-year results.
Halland	52%	0.42			Joined Jan. 1, 2005 - no 1-year results.
Jönköping	38%	0.41			Joined Jan. 1, 2005 - no 1-year results.
Kalmar					Joined Jan. 1, 2006 - no results 2005.
Kronoberg	37%	0.39			Joined Sep. 1, 2005 - no 1-year results.
Stockholm	45%	0.37			Only Danderyd and SöS joined 2005 - no 1-year results.
Södermanland	46%	0.31			Eskilstuna and Katrineholm joined in May 2005, Nyköping has not joined yet - no 1-year results.
Uppsala					Will join Sep. 1, 2006.
Värmland					Not joined yet.
Västmanland	36%	0.33			Joined Jan. 1, 2005 - no 1-year results.
Östergötland					Not joined yet.

Summary

This year we are changing our name to the Swedish Hip Arthroplasty Register in order clearly to indicate what the register contains. This has been shown to be of major importance not only to the general public but also to our principals.

There is no question that the Register plays a vital role when it comes to enabling the continuous development and improvement of Swedish THR surgery. Sweden's low revision burden in international comparisons is an effect of decades of continuously registering and evaluating the effectiveness of the procedure and any deviations from the expected result. We can now see the effects of this in the form of a reduced frequency of re-operations for the patient group as a whole, with a reduced load on the health service. This is extremely important, not least from a socio-economic angle.

It is important that the restructuring that is currently taking place within orthopaedics, with an increasing concentration on rural hospitals and private players, does not destroy the feedback and learning environment that has been built up by Swedish orthopaedics over a period of decades. The conditions for continuous training, development and feedback and the systematic, gradual introduction of new prosthesis technology must be available. If they are not, the quality of health care will be jeopardised and the costs of the increasing number of re-operations will skyrocket.

Clinical improvement programmes

One important effect that the register has achieved is that the number of implants used for routine interventions has decreased. In this year's report, we find that this trend is continuing. For many years, however, the Register has stressed that it is not only the inherent characteristics of the implant but also the surgical procedures as a whole that have an impact on the result. This means that it is not simply the implant per se but also the surgeon's experience and ability to handle the specific implant and any cementing technique during the operation that have a decisive impact. During the period of almost four decades in which hip implants have been used on an increasing scale, improvements to the surgical technique, with the emphasis on cementing, have been the most significant advance when it comes to improving the end result. This is well documented in previous register reports.

The development of implant technology has not been meaningless, however. There are important differences between different implant designs and they have been documented over the years. In recent years, we have also been able to demonstrate that different implants have different complication profiles when it comes to the risk of periprosthetic fracture. In this year's report, we also find that there are differences in the reasons for re-operation between the three most frequently used cemented stems.

Another new feature this year is that, for the first time, we have been able to evaluate the effect of small design changes related to stem shape. This means that the final design of the implant after the completion of surgery does have an impact on the result.

The reasons for these differences, in which the surface treatment of the stem appears to play a part, are not known in full. We do, however, know, not least as a result of radiostereometry studies, that, regardless of the implant that is used, it is to be expected that a large part of the stems move in one way or another in relation to the cement mantle. Depending on the design and surface treatment of the stem, this will have varying effects on implant survival. In this year's report, we have only studied three different designs and with a relatively short follow-up. As we are aware of the problem, there is good reason to conduct further analyses in the future, even when it comes to uncemented implants.

In recent years, we have seen a clear-cut trend towards a national change in the way implants are fixed in place. There is a slow increase in the number of uncemented implants and, at the same time, the number of hybrid prostheses is declining, while the reverse fixation method, with a cemented cup and uncemented stem, is increasing. The background to this trend is the increasing improvement in the documentation of uncemented stems and more or less pronounced problems associated with osteolysis around joint sockets. As time passes, the follow-up of certain types of uncemented stem is increasing and it is now relatively well established that certain uncemented stems function very well.

When it comes to the acetabulum, the situation is still uncertain. The introduction of new joint surfaces, such as high-molecular plastic, ceramic and perhaps even metal, has the potential to improve the situation, but this is as yet uncertain. Some studies indicate that uncemented cups influence pelvic loading in an unfavourable manner and thereby accelerate and perhaps even induce the formation of periprosthetic osteolysis. The introduction of new uncemented cups with a relatively elastic or thin metal shell has the potential to impact this scenario, something that should be the subject of future studies.

To summarise, the transition from cemented to uncemented technology is progressing very slowly in Sweden, which is pleasing. The excellent results for fully cemented fixation continue and there is every reason to continue selecting cemented fixation for the standard patient for many years to come.

Achievement of goals

This year's register report is characterised by increased openness when it comes to the individual clinics' results.

This increase in openness is in keeping with the times and we hope that it will benefit our patients, the profession and the organisation of principals purchasing these interventions. The ongoing feedback of results is probably one of the best driving forces when it comes to continuous improvements. It is, however, essential that obvious differences between different clinics are analysed to identify the causes. In last year's report, we launched a new index which reflects the patient composition at the individual clinic, which has a decisive effect on the result. In recent decades, a large amount of convincing evidence indicating that the results vary within large intervals, depending on the individual patient's situation, has been gathered. We have developed a so-called case-mix index to describe this phenomenon. We would like to point out that this work has only just begun and will continue in the years to come. It is to be hoped that this index will be continuously improved. As far as the organisation of principals is concerned, the ultimate result of the case-mix index will be that it will not be possible to determine whether there are any real differences in the results between different clinics until the type of patients who have undergone surgery is known. At the present time, we know that university hospitals/regional hospitals and some central hospitals operate on the patients who require the greatest surgical skill and who also suffer more complications. At the same time, extremely meticulous selection takes place at some rural hospitals to ensure that all the patients who are expected to run a higher risk of complications or to require longer post-operative care periods are systematically referred back to regional or central hospitals. In this year's report, we note not only these differences but also a relatively large variation in patient composition between clinics of the same type.

Problem areas

One important observation in one of our in-depth analyses is that patients who undergo an initial re-operation represent a highly specific risk group. This has not previously been so well known. The message is clear, however. Patients who are forced to undergo an early re-operation constitute a risk group in which the actual re-operation has only a limited ability definitively to solve the patient's problem. Even if this observation requires additional studies, it is already very important from a health-care strategy angle and means that at least some of these patients should be operated on at centres with large-scale experience of revision surgery.

For many years, the National Hip Arthroplasty Register was criticised for focusing exclusively on re-operations. The lack of knowledge about patients' perceived experience of the intervention and the occurrence of possible serious radiological complications which have not as yet been dealt with represent important information which is necessary for a satisfactory assessment of the quality of interventions. The follow-up model has addressed this problem in pioneering fashion. Its impact on the orthopaedic profession has been impressive, but its coverage is still not nationwide. As has been pointed out in this report, it is essential that every clinic joins the system. In the current competitive situation, it should be the obvious choice for the largest purchasers of free health care, and not least the private clinics, to join the follow-up routine in order to underline their wish to move towards high-quality health care. Participation in the register and the follow-up routine should be the most optimal proof of quality a hip replacement clinic can present. As has already been pointed out, this participation is a prerequisite for continuous improvement.

Current trends

The creation of the follow-up routine has had several other important effects. It has enabled a pilot study in the Western Region to calculate cost effectiveness – a concept that is going to be increasingly important and a prerequisite for satisfactory prioritisation in the health care of the future.

The registration of early complications in the Register and follow-up activities are also two ideal instruments for measuring changes in Sweden's health care organisation at an early stage and as effectively as possible. The ongoing structural change in orthopaedics and the transfer of hip replacement activities have the potential to have both a positive and a negative effect on results.

In future annual reports, we are planning continuously to improve registration and reporting based on the development of the follow-up routine and in-depth analyses. In the longer term, we hope that the extended registration of patient data based on the uniform information structure the IFK project may produce will further improve the final analysis. We also hope to be able to extend our collaboration with other registers in areas in which this could be justified in order to create a wider platform for our studies.

Over the past few years, the cost of running the Register has slowly increased. The Dagmar funding that has been allocated currently covers only about 40% of the annual total cost. For several years, the "deficit" has been covered by external funding, such as ALF funding and research funds. The potential for this kind of external financing has decreased sharply during the past two years. The Register has not wished to negotiate for "industrial sponsorship" in order to continue operating as a totally independent quality observer. Decision-makers at county councils must act quickly to avoid a financial crisis at quality registers. Full public funding of these activities should be a natural development in view of the fact that the National Hip Arthroplasty Register has helped to give Sweden one of the world's lowest re-operation frequencies, thereby saving the Swedish health service at least SEK 1 billion during the last 10 years.

Publications

Scientific Articles

Ahnfelt L, Andersson G, Herberts P. Reoperation av totala höftledsplastiker i Sverige. Läkartidningen 1980;77:2604-2607.

Strömberg C M, Herberts P, Ahnfelt L. Revision total hip arthroplasty in patients younger than 55 years old. Clinical and radiological results after 4 years. J Arthroplasty 1988;3:47-59.

Ahnfelt L, Herberts P, Andersson G B J. Complications in Total Hip Arthroplasties. In Proceedings of "Course on Biomaterials: part II". Acta Orthop Scand 1988;59:353-357.

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2.2 Operative Steps: Femur, page 28-36.
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Address
The Swedish Hip Arthroplasty Register
Department of Orthopaedics
Sahlgrenska University Hospital
SE-413 45 Göteborg, Sweden

Telephone: (at each contact below)
Fax: +46 31 82 55 99
www.jru.orthop.gu.se

Project Leaders
Professor Johan Kärrholm, MD, PhD
Telephone: +46 31 342 82 47
E-mail: johan.karrholm@vgregion.se

Göran Garellick, MD, PhD
Telephone: +46 31 342 82 45
E-mail: goran.garellick@vgregion.se

Professor Emeritus Peter Herberts, MD, PhD
Telephone: +46 31 342 22 65
E-mail: peter.herberts@vgregion.se

Other contact persons
Register Coordinator Kajsa Erikson
Telephone: +46 31 342 35 16
E-mail: kajsa.erikson@vgregion.se

Register Coordinator Karin Lindborg
Telephone: +46 31 342 18 39
E-mail: karin.lindborg@vgregion.se

Register Coordinator Karin Pettersson
Telephone: +46 31 342 18 39
E-mail: karin.mar.pettersson@vgregion.se

Systems Manager Ramin Namitabar
Telephone: +46 31 342 82 42
E-mail: ramin@orthop.gu.se

Register Associates
Thomas Eisler, MD, PhD
E-mail: eisler@algonet.se

Hans Lindahl, MD, PhD
E-mail: hans.lindahl@vgregion.se

Swedish Orthopeadic Association

Joint Replacement Unit
Sahlgrenska University Hospital
Göteborg, Sweden